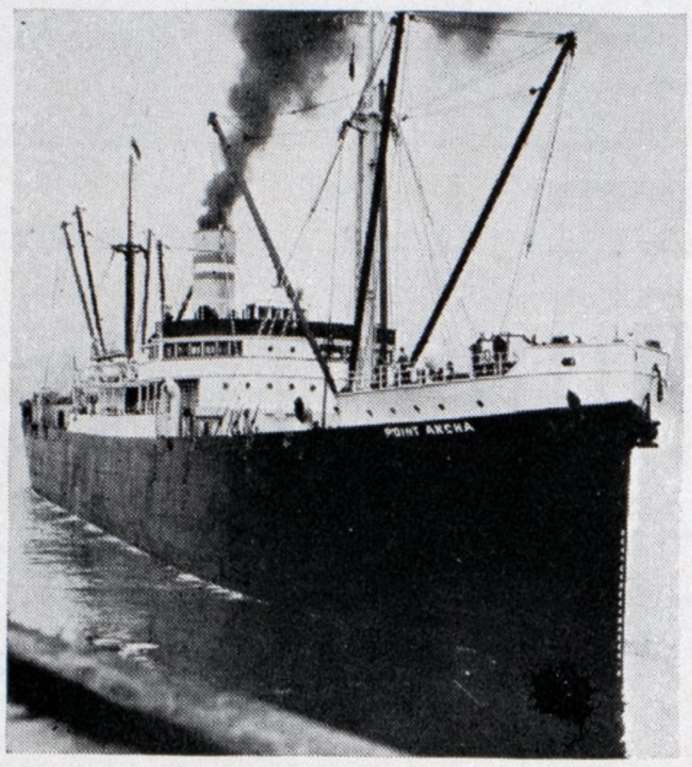
Marine Review

SHIP OPERATION SHIPBUILDING CARGO HANDLING

The National Publication Covering the Business of Transportation by Water

CLEVELAND FOUNDED 1878 NEW YORK



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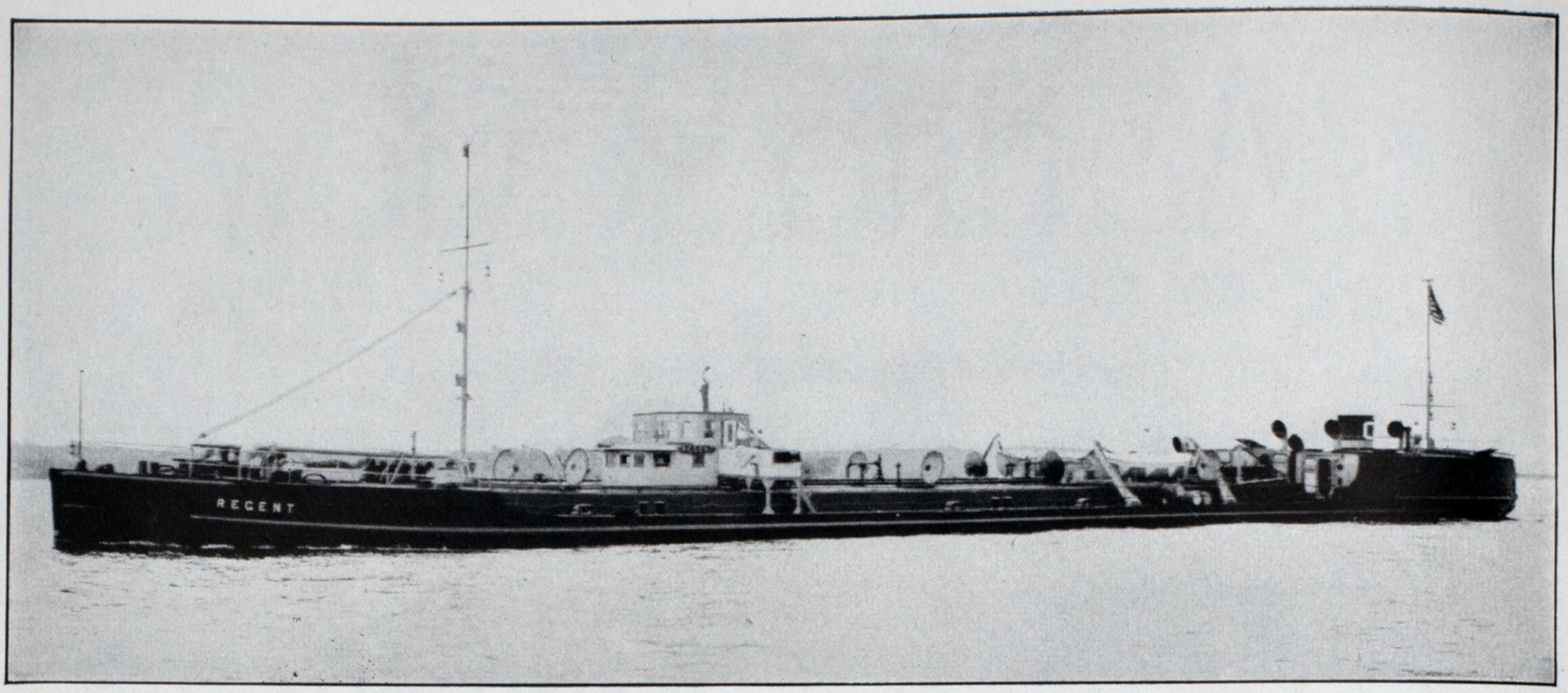

Twin-screw, Diesel-engined Tanker REGENT

ANOTHER BETHLEHEM-BUILT TANKER JOINS GULF FLEET

Twin-Screw Diesel Vessel for Great Lakes—Barge Canal—Coastwise Service

THE twin-screw diesel tanker REGENT, built at Bethlehem's Sparrows Point Plant, has joined the Gulf Refining Company's similar Bethlehem-built vessels HARMONY and SUPREME in the Great Lakes—Barge Canal—Coastwise Service.

The REGENT makes the fourth consecutive self-propelled vessel built by Bethlehem for the Gulf Refining Company's distributing service.

Specifications

Length overall	255 ft.
Length between perpendiculars	247 ft.
Breadth molded	40 ft.
Depth molded	14 ft. 6 in.
Draft—	
In Salt water	12 ft.
In Fresh water for canal operation	9 ft. 6 in.
Cargo capacity	15,400 bbl.
Gross tonnage	1211
Net tonnage	708

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Marine Review

FOUNDED 1878

SHIP OPERATION - SHIPBUILDING - CARGO HANDLING

Volume 65 **January, 1935** **Number 1**

Quick Action is Urgent on Shipping Policy

DAMN the torpedoes, go ahead," Farragut's famous signal to his fleet at Mobile bay, was recently quoted by an administration spokesman as the kind of spirit for American business to emulate. The American merchant marine of today would not be true to the splendid traditions of its past were it to disparage such a spirit. But if it seemed apparent that some of these 'torpedoes' were being directed against the merchant marine by those who should have its best interests at heart it will surely not be unreasonable to suggest, "cease firing, we have enough to contend with from our enemies without running the hazard of being sunk by our friends."

While recognizing that a revision of our merchant marine policy is desirable and that the camouflage of recognized necessary aid to vessels engaged in foreign trade under the guise of mail pay should be replaced by a straight subsidy on a wider and more equitable basis, as proposed by the President and his advisers, it is urgent that there be an end to the inquisition the administration has been carrying on since it took office nearly two years ago. Hold those who may be responsible for irregularities to strict accountability but don't jeopardize the whole structure of the merchant marine.

What progress is being made and how long is it going to be before a definite policy becomes effective? These are the questions which must be answered. Order must be brought out of the present chaos in American shipping affairs. Whether those in authority consider it reasonable or not that is the state of mind at present.

The director of the shipping board recently enumerated the steps which the administration is taking to build up a strong and efficient merchant marine as follows:

1. The recent investigation of ocean mail contracts by a special committee of the senate.
2. The investigation and hearings now being conducted by the post office department.
3. A study by the federal coordinator of transportation on the coordination, on a national scale, of land, water, and air transport activities.
4. The work of the inter-departmental committee on a shipping policy.
5. Preparing the shipping board bureau for carrying on efficiently the administration of the new shipping policy when it is established.

The senate investigation, the director believes, has "performed a valuable service in revealing and emphasizing the fundamental weaknesses of the present system of camouflaged and indirect subsidies which makes irregularities inevitable." He is also of the opinion that the basic assumption of the federal coordinator, "that efficiency of transportation, economy of operation, and a square deal for carriers and shippers can best be promoted by coordinating, on a national scale, our land, water and air transport activities."

Of most immediate and direct interest to the shipping industry is the work of the inter-departmental committee. This work, the director encouragingly points out, has been so well done and has progressed so far that the report which it will present to the President, before the convening of congress, "will form a starting point from which congress can readily, within the space of a single session, produce a law which will be far and away the best merchant marine legislation that ever found its place on the statute books of the United States."

We believe the President and his advisers are moved by a sincere desire to protect and build up the merchant marine. No doubt it is a difficult problem but one can hardly fail to notice that it has not been approached with the directness and vigor applied to the building up of the naval forces. This has not been due to any uncertainty in the position of the President, and in the national welfare he should now put a stop to political bickering and insist on speedy action on a sound business basis.

THE BATTLE CRUISER,

A Study of its Importance as a Warship

By COMMANDER H. E. ROSSELL*

THE battle cruiser is a type of warship the importance of which seems to have been overlooked in the haste of the naval powers to build up their light cruisers strengths to permissible limits. In 1935 the prohibition on the construction of battle cruisers will come up again for discussion, and it is to be hoped that the naval powers will give consideration at that time to the great merits of the type.

The battle cruiser was really an outgrowth of the armored cruiser, the history of which dates back to about 1870. From that time to 1890 a considerable number of armored cruisers were built by England, Russia, and France.

It appears that the designers of the armored cruisers of the 90's and of the early years of the present century had in mind that the chief functions of these vessels would be protection and destruction of commerce. There seems to have been the thought also, particularly in France, that the large cruisers would serve in the battle line in opposition to battleships. This idea gained great support as a result of the experiences of the Russo-Japanese war. At Round Island and again at Tsushima the Japanese armored cruisers, with their 6-inch and 8-inch guns, not only kept station in the battle line, but they caused heavy damage to the Russian battleships armed with 12-inch guns.

At once the prestige of the armored cruiser rose to an all time high. Few imagined then that within the next twelve years the type would prove well nigh useless in a great naval war, or that three out of four fine armored cruisers could be destroyed by artillery attack within about two minutes. Yet the latter experience befell Arbuthnot's squadron when it ventured to within some 8000 yards of the head of the German battle line at Jutland.

What had taken place in the meantime to account for the reversal of form? First of all there had been major improvements in the effectiveness of artillery, with no corresponding increases in the resistance of armor. The penetrative power of shell of a given caliber had been increased materially through higher muzzle velocities and more efficient design of projectiles. Also greater accuracy and rapidity of gun fire had been made possible, by more efficient methods of control.

Eclipse of Armored Cruiser

Even before the apearance of the DREADNOUGHT thoughtful persons might have foreseen the eclipse of the armored cruiser (some did so). As early as 1904 the characteristics of the Italian battleships of the VITTORIO EMANUELE III class indicated that more speed and gun-power and better defensive qualities would be necessary in large cruisers of the future. These Italian vessels, though rated as battleships, might properly have been classed as the first battle cruisers, for they combined the offensive and defensive qualities of the battleship with the speed of the cruiser. They were vessels which could be relied upon to take punishment as well as to give it.

In 1905 in an excellent paper, entitled *The Cruiser*, Prof. William Hovgaard of Massachusetts Institute of Technology concluded that for strictly military service the armored cruiser should be abandoned, and that a more powerful type should be built in its stead. The latter, which he styled the battleship cruiser, was to be a ship with a battery and protection of a battleship, but with 15 to 20 per cent more speed. The military duties of the proposed new type were to be, first, rapid concentrations and enveloping movements during fleet action, and pursuit of a retreating enemy; second, support and assistance of smaller cruisers; third, reconnaissance in force, involving perhaps breaking through a screen of lighter vessels; and, fourth, independent expeditions.

During the years from 1907 to 1918 battle cruisers were built in considerable numbers, principally by England and Germany. In the former country armor was kept to less thickness than on contemporary battleships, while gun power and speed were emphasized. Thus in the LION class (1910) the designed speed was 27 knots (27 to 28¼ knots on trials) and eight 13½-inch guns were carried, while the side armor had a maximum thickness of but 9 inches over a narrow belt on the waterline, and gun turrets and decks were not heavily armored. The contemporary battleship, ORION, had a belt of 12-inch thickness and carried ten 13½-inch guns. ORION'S displacement of 22,500 tons was about 4000 tons less than that of LION.

In Germany, on the other hand, more emphasis was placed on protection of battle cruisers and less on gun power and speed. For example, the SEYD-

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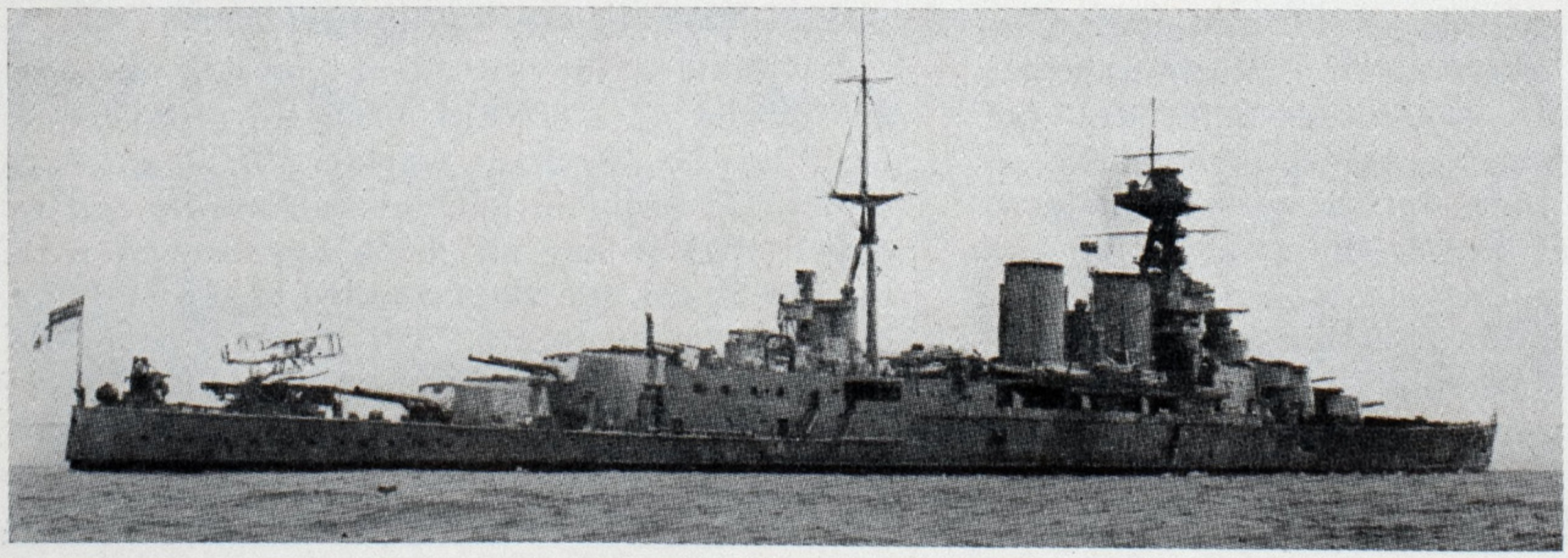
*Abstract of paper entitled, *The Battle Cruiser*, by Commander H. E. Rossell (CC) U. S. N., presented at the annual meeting of the Society of Naval Architects and Marine Engineers, at New York, Nov. 16, 1934. Commander Rossell is professor of Naval Construction at the Massachusetts Institute of Technology, Cambridge, Mass.

The four photographs used to illustrate Commander Rossell's paper, two of which are reproduced, were published through the courtesy of Jane's *Fighting Ships*.



British battle cruiser Hood, largest and most powerful ship of this type ever built. Displ., loaded, reported to be 46,200 tons. Speed, 31 knots. Main battery, eight 15-inch guns

LITZ (1910) carried a primary battery of ten 11-inch guns on a displacement of 24,600 tons. Her speed was only 26½ knots, but her protection was both extensive and heavy, the maximum thickness of belt being 11.8 inches. In the DERFFLINGER class, 1913, the main battery was increased to eight 12-inch guns and the displacement was raised to 26,200 tons. The speed was 26½ knots and the armor was somewhat heavier than that of SEYDLITZ.

Vessels of this type, reflecting in their characteristics these differences of opinion, were destined to play important roles in the World war. An analysis of their experiences in this conflict should indicate the most important functions of such ships and the characteristics which they should possess in order to carry out these duties efficiently.

Battle Cruisers in the War

The first important action of the war was the battle of Heligoland, Aug. 28, 1914. Acting upon information that the Germans were maintaining a patrol of destroyers and light cruisers in Heligoland bight, Jellicoe despatched a formidable force to surprise these light craft and to cut off as many of them as possible. The British force, which was commanded by Admiral Beatty, consisted of five battle cruisers, a like number of armored cruisers, a squadron of light cruisers, two flotillas of destroyers, and six submarines. The plan was for three of the submarines to show themselves to the westward of Heligoland in the hope that German light craft would be drawn out to attack them. Following this ruse, the British destroyers were to come down from the north in order to cut off the enemy. The other three submarines were to take position south of Heligoland and to await a chance to attack. The remainder of the British force was to keep well to the westward of Heligoland, from which station it could come in to support if necessary.

The British plan was only partially successful. German light cruisers and torpedo vessels were sent out upon report from one of the patroling detsroyers that two torpedoes had been fired at her by a submarine. The British destroyers came down from the north as planned and light cruisers of both sides entered the action which followed. Soon the battle developed into a series of disjointed engagements.

The battle had been in progress for several hours when Beatty decided to take in his battle cruisers. They came upon the enemy light cruiser COLN, which had started an engagement with the British light cruiser ARETHUSA and a flotilla of destroyers. The battle cruisers opened fire on the COLN and she fled. At this point the old German light cruiser ARIADNE appeared and received two salvos from the LION. She started to burn fiercely and disappeared in the haze. She sank about three hours later. After the attack on ARIADNE, Beatty decided to retire from the bight. On his way out he encountered COLN again and gave her two salvos, which sank her at once.

The action was of interest from the point of view of the designer for it illustrated one important function of battle cruisers, namely the support of light cruisers in an engagement with vessels of similar type. For duty of this kind high speed and heavy striking power are desirable. Under the conditions at the battle of Heligoland the former quality was not of great importance, but it is not improbable that future actions of similar type may require the supporting battle cruisers to steam at good speed. Moreover, these vessels may encounter heavily armed enemy ships, themselves engaged in a similar mission. In that event the battle cruisers will need heavy protection.

Battle of Falkland Islands

Only a few months after Heligoland, two battle cruisers of the INVINCIBLE class were to win great prestige for the type at the battle of the Falkland islands, Dec. 8, 1914. The ships had been sent there in great secrecy to intercept Von Spee's squadron. It will be recalled that Von Spee had dealt the British a most humiliating defeat at Coronel.

The German squadron appeared off Port Stanley in the Falklands while the British battle cruisers were at anchor there and in the act of coaling. The main German units were the crack armored cruisers SCHARNHORST and GNEISENAU. As these ships with their primary batteries of 8.3-inch guns could not be expected to engage successfully such formidable opponents, Von Spee made off at full speed in an attempt to escape. His speed of some 23 knots was insuffcient, however, and he was overtaken shortly by the faster and more powerful British battle cruisers. The action which followed was a perfect example of the enormous advantage of the possession by one side of both superior speed and greater gun power without inferior protection.

British Able to Force Action

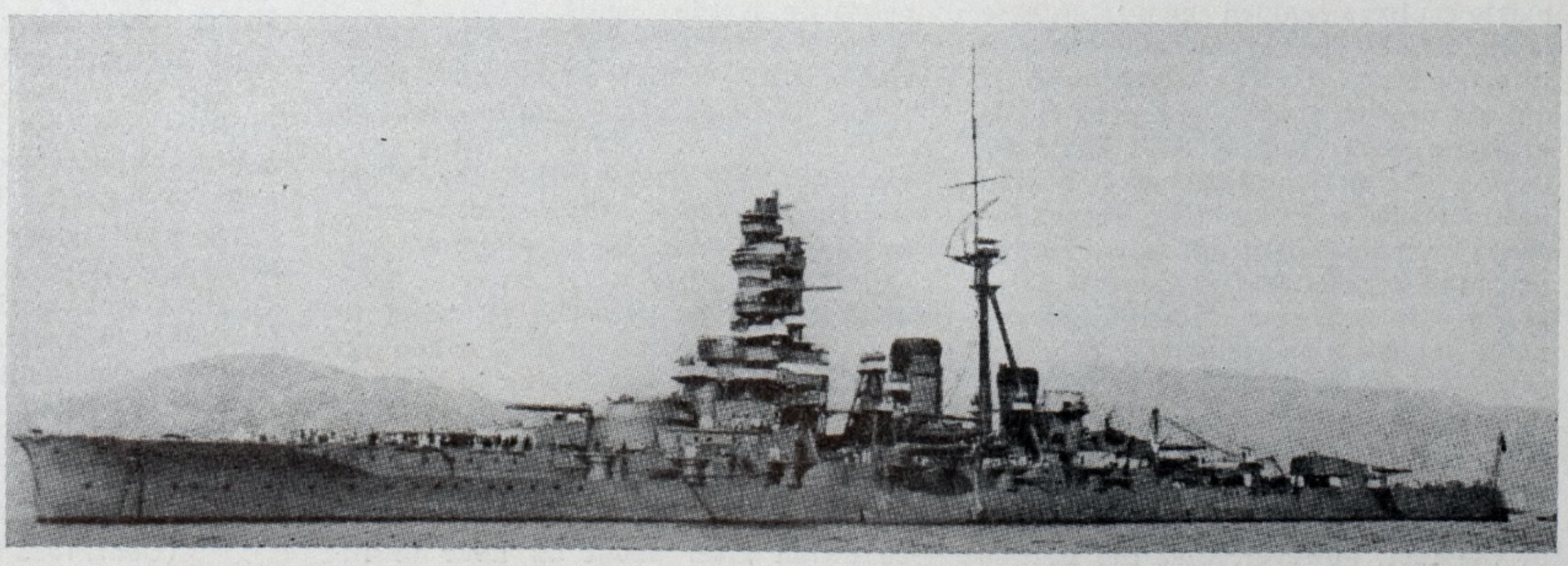
The British were able to force action against the will of the enemy and then to choose a range which was suitable for the 12-inch guns of their ships but which was excessive for the smaller guns of the enemy. The result was never in doubt. The German armored cruisers were destroyed in leisurely fashion and the British battle cruisers sustained only minor injuries.

The duty of intercepting and destroying Von Spee's squadron may be classed as an independent mission. Of course the characteristics necessary in a battle cruiser for participation in projects of this kind cannot be determined from the single instance which has been cited. In this particular case great cruising radius, high speed and powerful armament were necessary, while defensive qualities were of secondary importance.

It appears that questionable conclusions were drawn in Great Britain from the results of the action. Undue importance seems to have been attached to speed and gun power, while the value of protection was grossly underestimated.

Other examples of independent missions carried out by battle cruisers were the forays made by the Germans on undefended towns on the eastern coast of England. These projects demanded high speed and great striking power. Good protection could have served only as an insurance of a reasonable chance of survival in the event of an unexpected encounter with heavy enemy ships.

About the middle of January, 1915,



Kirishima, one of three Japanese battle cruisers. Japanese battle cruisers have only moderate speed, about 26 knots, but have good protection. Main battery, eight 14-inch guns

a strong German force was engaged in a somewhat similar undertaking when powerful enemy vessels were encountered. The German squadron, consisting of three battle cruisers, an armored cruiser, four light cruisers and 19 destroyers, had gone to the Dogger bank to clear the area of British light craft. At the time, Beatty was approaching these waters with five battle cruisers, seven light cruisers and 35 destroyers. Contact between light cruisers of the two forces was made at about 7 a.m. on Jan. 24. Thereupon the German force turned toward home in an effort to escape.

The action which ensued was a stern chase in which the light craft of both sides took practically no part. The British battle cruisers by virtue of their superior speed were able to close the distance slowly so that by about 9 o'clock the rear ship of the German line, the armored cruiser BLUCHER, came within range of LION'S guns at 20,000 yards. Soon thereafter the German battle cruisers came within range also. Their fire was directed mainly at LION, and she suffered such severe injuries that she was almost destroyed. An ammunition fire, which followed a hit forward, reached the handling room and destruction of the ship was averted only by the flooding of magazines. Another serious hit amidships damaged the port condenser and caused the ship to lose speed. It was necessary to take her in tow after the action.

Of the German battle cruisers, the SEYDLITZ only was badly damaged. A shell pierced her after barbette and the ensuing ammunition fire burned out both of the after turrets. Magazines were flooded in time to prevent an explosion.

The relatively weak BLUCHER fared badly. Her protective decks were penetrated by long range shell fire and her already moderate speed was so impaired that she fell back under the concentrated fire of British battle cruisers. Finally she capsized after having offered very stubborn resistance for over three hours.

Conclusion Drawn from Battle

A number of interesting conclusions may be drawn from the events of the battle of Dogger bank. In the first place, the superior speed of the British battle cruisers enabled them to enforce action and to destroy an enemy ship of inferior type. On the other hand, it did not prevent the slower enemy battle cruisers from making good their escape. The action demonstrated that battle cruisers engaged on reconnaissance or independent missions must be prepared to meet powerful enemy ships perhaps in superior strength. It did not demonstrate conclusively that the relatively heavy protection of the German battle cruisers was an important advantage, for one ship on each side sustained serious injuries as a result of gun fire. One should not lose sight of the fact, however, that the British ships had superiority in numbers of five to three (not counting BLUCHER) and that they had an even greater superiority in gun power.

The great range at which the action began and the penetration of BLUCHER'S decks by plunging shell indicated the growing importance of deck protection and the necessity of designing turrets for high elevation of guns. The ammunition fires in handling rooms of LION and SEYDLITZ showed the importance of good protection on turrets and barbettes, and the necessity of devices to prevent the spread of flames to magazines.

Great Fleet Action at Jutland

It remained for the great fleet action at Jutland to demonstrate additional functions of the battle cruiser. Before contact was made the British and German battle fleets were at sea off the Danish coast in almost full strength. Apparently neither suspected that it was in close proximity to the other. Each had a squadron of battle cruisers far out in advance as a powerful scouting line able to sweep aside any weak enemy vessels and to penetrate to within a short distance of enemy ships of corresponding strength. Both squadrons were accompanied by screens of light cruisers and destroyers. It is clear that work of this kind demands high speed and great offensive and defensive power on the part of the battle cruisers.

Contact between the two squadrons was made by light cruisers. Von Hipper, the German commander, turned to the southeast toward his battle fleet, which was some 40 miles away. Beatty took up a nearly parallel course and with his superior speed drew slowly ahead apparently with the idea of cutting off the enemy cruisers from return to their home base. On paper the British force looked to be the stronger. It contained six battle cruisers to five for the enemy and it enjoyed superiority in speed and in caliber of guns. Moreover, there were four battleships of the QUEEN ELIZABETH class only five miles astern. These ships made 25 knots and were in fact better fitted for the duties of battle cruisers than were any other vessels under Beatty's command. Time was pressing, however, and the fight was on with the QUEEN ELIZABETHS left to catch up if they could.

On the famous run to the southward, Beatty's high hopes were shattered. Two of his six ships blew up as a result of magazine explosions, while a third, his flagship LION, almost met the same fate. She was saved only by the heroism of the mortally wounded officer of the waist turret. This officer had the presence of mind to have the magazine flooded when an ammunition fire was raging in his turret. While all of this destruction was taking place the German cruisers were not suffering much. All of them reached the end of the run in good condition after about an hour of intensive fighting at ranges of 12,600 to 20,900 yards. Their 11 and and 12-inch guns had done great service against the 12 and 13½-inch guns of the British. Toward the end of the run to the southward a diversion took place in the shape of a destroyer attack, launched simultaneously by both sides. Secondary batteries were called into play on English and German battle cruisers. The first phase of the battle ended with the approach of the German battle fleet. Beatty turned off to the northward, and he was followed in this maneuver by Von Hipper, whose ships formed a line in the van of the battle fleet.

Second Phase of the Battle

The second phase of the battle was a similar run to the northward. Here the Germans did not fare so well, for the formidable QUEEN ELIZABETHS had tailed in astern of Beatty. They proved to be more than a match for the German battle cruisers, all of which suffered badly. Ranges were somewhat greater than they had been during the first phase of the battle. In fact they were at times too great for effective reply by Von Hipper's ships. Beatty's four remaining battle cruisers did not take an active part in this stage of the engagement. They drew well ahead and then bore off to the eastward to take station in the van of Jellicoe's battle fleet, which by this time had arrived. Beatty effected juncture with three battle cruisers under Hood. The latter ships had been stationed in Jellicoe's screen whence they had been sent ahead to join Beatty.

The arrival of Jellico and the deployment of his ships into line ahead on an easterly course ended the second phase of the battle. The long British battle line with seven battle cruisers in its van was now in a position to envelop the entire German fleet, which had been forced to alter course to the eastward to parallel Jellicoe. Von Hipper was still at the head of the German line and his ships were coming under the fire of the British battleships and battle cruisers at short ranges. The opposing battle cruisers engaged in a particularly violent action, in which the INVINCIBLE, Hood's flagship, blew up due to magazine explosion. During the interval of about two hours and a half from the start of the battle to the destruction of the INVINCIBLE, the German battle cruisers had been heavily engaged by capital ships, some of which mounted guns as large as 15 inches in caliber.

The position of the German fleet was becoming desperate for Jellicoe's battle line was working around to the southeast in an enveloping movement. In this difficult situation Von Scheer, German commander-in-chief, launched a destroyer attack as a diversion and then left Von Hipper to cover the counter march and retreat of the Ger-

(*Continued on Page* 26)

Business Men's PROSPERITY SURVEY

HERE'S a chance to give voice to your own ideas as to which national policies you believe most likely to speed recovery in your line of business.

BALLOTS like this are being published this month in many business papers affiliated with The Associated Business Papers, Inc.—reaching virtually all key men in every line of industry, trade and profession throughout the nation.

BUSINESS men, nationally, may appreciate an opportunity to express their convictions to a strictly non-partisan and impartial body—with the assurance that by so doing, business views will be presented effectively to the political, banking, industrial, business and labor leaders of the country.

QUESTIONS on the economic ballot below are prefaced with "In your line of business" to make possible an industry by industry study as well as a consensus of business opinion in all fields of industry—so let our industry be well represented in the responses.

ECONOMIC BALLOT

Check your convictions, sign, clip and mail this ballot.

1. As regards the possibility of Congress adopting a universal thirty-hour work week, do you favor such legislation? Yes ( ) No ( ); and if so on the basis of ( ) continuation of existing weekly wages, or ( ) continuation of existing hourly rates of pay.

2. In your line of business are you satisfied with enforcement of maximum hours and minimum wage provisions now in effect? Yes ( ) No ( )

3. In your line of business is there obtainable ample **working** capital—from banks? Yes ( ) No ( ); from government agencies? Yes ( ) No ( )

4. In your line of business is there obtainable ample **investment** capital—from banks? Yes ( ) No ( ); from government agencies? Yes ( ) No ( )

5. In your line of business do you favor limitation of industrial output—by government control? Yes ( ) No ( ); by industry control? Yes ( ) No ( )

6. In your line of business do you favor a plan for control of prices—by a code provision establishing price fixing? Yes ( ) No ( ); by a code provision establishing an open price plan? Yes ( ) No ( )

7. In your line of business do you think that government measures now in effect are **helping** small and medium sized enterprises? Yes ( ) No ( ); hurting such enterprises? Yes ( ) No ( )

Signed .....

Firm .....

Business .....

Please return this ballot to
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New York, N. Y.

BARGE CANAL,

Increase in Total Tonnage Transported

BY JOHN J. BRYAN

THE 1934 season of navigation on the New York State canal system closed shortly after Nov. 30, that being the last day set for issuing clearances to vessels, unless weather conditions necessitated an earlier closing. The division of canals and waterways of the department of public works of the state of New York permits all vessels on the canal to finish that trip, so that navigation sometimes lasts a week or ten days longer.

Up to and including Nov. 3, which was the latest day which figures were available as this is written, the total tonnage transported on this system amounted to 3,583,716 short tons, as compared with 3,568,642 short tons for the corresponding period of 1933, a gain of 15,074 tons. With four weeks of the season still to go, and all active carriers operating in a manner resembling boom times, it is confidently expected that the 1934 season total tonnage will exceed that of 1933 (4,074,002 short tons), which was the banner year of operation since the opening of the system.

Diversity of Products Shipped

While it is the general impression that the canal is used only to ship gasoline west and grain east, there is in fact a wide diversification of commodities making up the total movement of traffic. The kind of commodities and their amounts, in short tons, shipped via the New York State Barge canal system during 1934, up to and including Nov. 3, are listed in the following tabulation.

Manufactured, Miscellaneous Products	
Pig Iron and Billets	35,369
Iron or Steel Articles	24,930
Other Metals	21,554
Petroleum and its Products	1,437,437
Cement and Lime	9,766
Molasses	34,033
Sugar	189,223
Implements, Vehicles, and Parts	25,012
Machinery and Tools	2,112
Paper and Paper Products	13,519
Canned Food Products	6,371
Scrap Iron	82,956
Oil Meal and Cake	2,830
Fertilizers	138,393
Chemicals, Drugs, etc.	205,528
All Other	43,404
Products of Animals	
Meats, Dressed	18
All Other	1,447
Products of Agriculture	
Wheat	555,454
Corn	131,522
Oats	40,952
Rye	45,577
Barley	11,564
Flour	66,443
Hay	2,140
Flaxseed	27,382
Stock Feed	3,378
Fruits and Vegetables	68
All Other	22,202
Products of the Forest	
Lumber	33,865
Wood Pulp	24,944
Pulpwood	29,357
Crude Rubber	20,455
All Other	3,627
Products of the Ground	
Salt	27,778
Anthracite Coal	7,410
Bituminous Coal	4,582
Iron Ore	2,240
Other Ores	11,350
Sand, Stone, Gravel	43,728
Clay	1,129
Sulphur	178,222
All Other	14,445
Total for 1934, to and incl. Nov. 3.	**3,583,716**

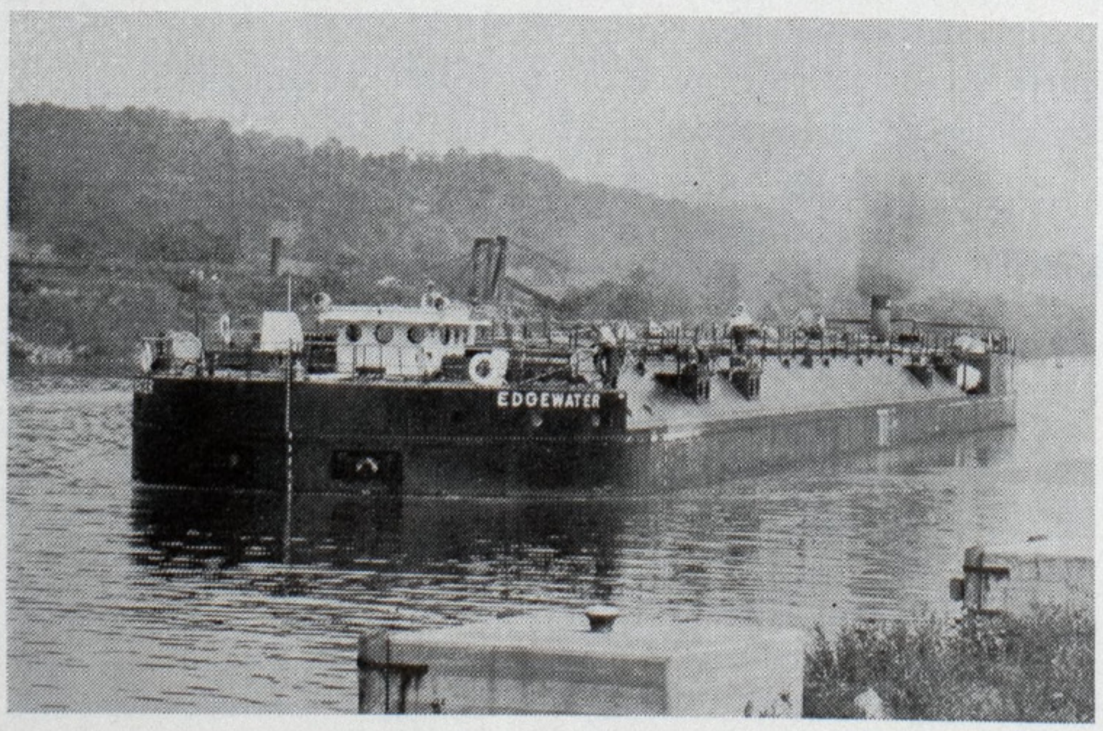
Movements of iron or steel articles, petroleum and its products, fertilizers, grain (wheat, corn, oats, rye, and barley), flaxseed, woodpulp, iron ore, and other ores during 1934, up to and including Nov. 3, had already exceeded the movement of the same commodities for the entire season of 1933.

Minimum clearance under fixed bridges throughout the canal system is 15 feet, 6 inches. Length of the lock chambers from the lower gate to the breast wall is 310 feet, so that no craft over 300 feet in length can be accommodated. The width of the lock chamber is 45 feet, except at the Federal lock at Troy, where the width is 44.44 feet, and this must govern. The navigable depth of the canals is 12 feet.

Upper—Lock 6 at the Waterford flight. Drop of 169 feet in a little over a mile from the Mohawk to the Hudson river Lower—Steel fleet in lock 28A at Lyons

The two largest freighters in operation during 1934 are 300 feet long, 43 feet beam, and operate on a draft of 9.6 feet. The holds are 20 feet deep.

No particular type of craft can be said to be best adapted for use on the canal, as the type is entirely dependent on the class of commodity to be carried. Individual motorships or steamships (such as the EDGEWATER and CHESTER) carry 1500 to 1800 tons on a trip, while a steamer and six barges will carry nearly 4000 tons. It is true that an individual motorship or



THE Ford Co.'s twin screw steamship Edgewater, one of the newer freighters operating on the canal. Length, 300 feet; beam, 43 feet; canal draft, 9.6 feet; depth, 20 feet; capacity, 2175 tons. See MARINE REVIEW *for April, 1932*

steamship will operate much faster than a fleet, but the expense of maintenance and operation of the individual self-propelled vessel is much greater than that of a steamer and its consort.

It can readily be understood that no one type of vessel could be constructed that would fill the needs for the various services now being rendered. Private operating companies are now prepared to provide the following different services: Freight vessels, generally motorships, in through cargo services; bulk cargoes; tank barges and tank motorships; salvage operations and diving; shipments to intermediate points in boat loads; and package cargoes. There are also offered barges suitable for heavy machinery and boilers; vessels for towing; deck scows for handling lumber, steel and iron; and barges with removable cross beams for handling long pieces.

Maintenance of the Canals

At present the department of public works of the state of New York is maintaining the canal channel with its own equipment, under the supervision of the commissioner of canals and waterways. Sweep boats are continually in operation, searching for spots where silt or other foreign matter may have caused the depth of channel to be less than the statutory 12 feet. Banks are being rip-rapped to prevent wash by passing vessels. Equipment and machinery are rigidly inspected at frequent intervals to forestall failure at any point.

Due to the 12-foot limitation in the depth of water there are 29 self-propelled vessels and many more barges in operation, all of which are unable to load to full capacity. These same vessels are also unable to sail light on account of the low fixed bridges. To go under these bridges they are compelled to carry ballast. Tank vessels must be thoroughly cleansed of this ballast so that it will not contaminate the product to be loaded. Loading ballast takes from 2 to 4 hours while pumping out ballast takes from 4 to 8 hours.

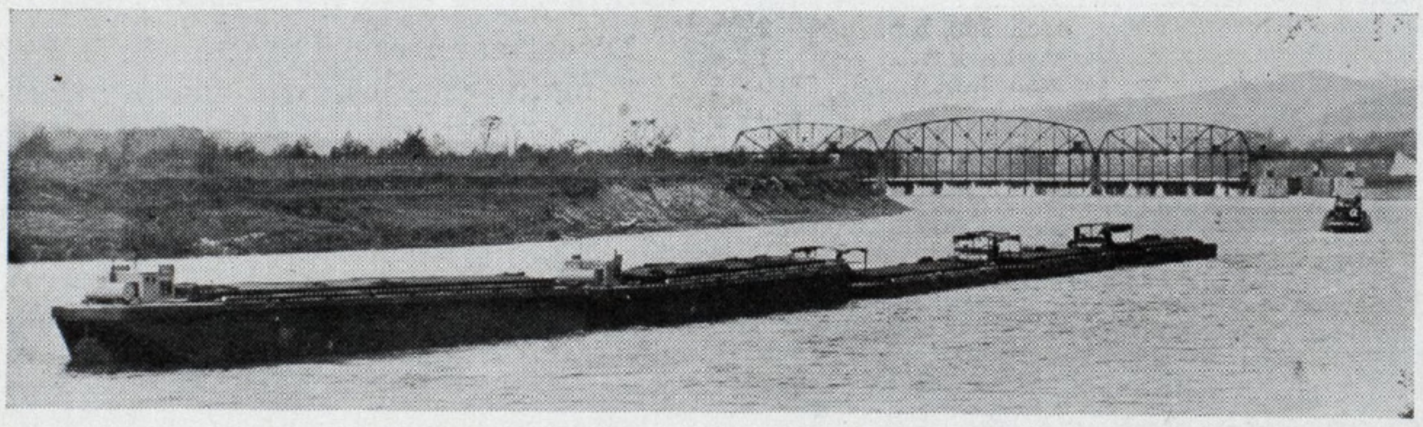
If the canal channel were deepened to 14 feet and the fixed bridges raised to a minimum of 25 feet, vessels of a capacity of 4000 tons could operate. This would undoubtedly have the effect of increasing the tonnage carried an additional half million tons annually. This latter type vessel with its greatly increased carrying capacity could operate with the same personnel, and at only a nominal increase in fuel and other operating costs. It would open the way for many of the smaller Great Lakes vessels and it would attract more tonnage than is now handled via the Atlantic coast and St. Lawrence river as it would cut the time enroute between New York and Great Lakes ports in half. Also, the hazards would be less, the insurance lower, and the operation cheaper.

A MODERN barge canal terminal. Erie basin terminal warehouse at Buffalo Length, 502 feet; width, 80 feet. Built on a pier 600 feet long by 150 feet wide

Canal System is Free

Pleasure boats are allowed to navigate the canals. Permits may be obtained on application to the commissioner of canals and waterways at Albany, N. Y., or at any port of entry to the canal. All that is necessary is for the owner to make application, describing his craft. Although rowboats and canoes, whether or not they are equipped with mechanical power, are allowed to use the canals without a permit, the locks will not be operated for their passage

The entire canal system is free as the state constitution provides that no tolls shall be imposed on persons or property transported on the canals. It is mandatory, however that persons using the canal shall strictly observe the laws, rules, and regulations governing navigation thereof as may be promulgated.



Above — Tug and fleet of 5 barges, westbound, on the Mohawk river At right—Diesel tanker Albany Socony, one of the fleet of the Socony - Vacuum Transportation Co.

Appointments Made

The Reading Iron Co. well known for its manufacture of genuine puddled wrought iron products has recently announced that C. T. Ressler, formerly manager of railroad and marine sales has been appointed specification engineer in the sales division, with headquarters at 401 North Broad street, Philadelphia. R. I. Fretz, formerly district sales representative, with headquarters at Columbus, O., has been appointed manager of eastern railroad and marine sales with headquarters at 401 North Broad street, Philadelphia.

Bryant Myers has been appointed to the company's Pacific coast sales force with headquarters at 213 Sheldon building, San Francisco. He will report to J. K. Almer, manager of sales, Pacific coast region, whose headquarters are at Los Angeles.

HARBOR CUTTERS,

Single Screw, Diesel Electric Drive

THE third group of vessels in the large new shipbuilding program of the United States coast guard is now nearing completion. This group includes four, single screw, diesel electric harbor cutters, named CALUMET, NAVESINK, TUCKAHOE and HUDSON. The building of these new vessels was awarded on Dec. 8, 1933 to the navy department on its estimate of $235,953 as the cost for each boat. The navy deparment allocated the building of the HUDSON to the navy yard at Portsmouth, N. H. The HUDSON was launched on Oct. 5 and completed on Oct. 29. Building of the CALUMET, NAVESINK and TUCKAHOE was allocated to the navy yard, Charleston, S. C. All three of these vessels were launched by floating from drydock, Sept. 28. The CALUMET was completed on Nov. 15. The NAVESINK was scheduled for completion about Dec. 15 and the TUCKAHOE about Jan. 15, 1935

These cutters, though not large, represent the latest development in modern marine engineering as applied to diesel electric drive. They were designed especially for harbor use.

Deck of Wrought Iron

The hull construction is rugged. The shell plating is all of medium steel and is worked on the in and out system. All shell rivets are of wrought iron. The sheer strake is of 15.3-pound plate amidships, tapering to 12.8 pounds at the ends of the vessel. Side plating is 12.8 pounds throughout except along wind and water forward, where 15.3-pound plating is used. Bottom plating varies from 12.8 pounds amidships to 10.2 pounds at the ends. Furnaced plates are somewhat heavier.

Fender guards of split 8-inch extra heavy pipe are welded to the shell plating. Vertical guards of split 6-inch pipe are interposed between the longitudinal guards amidships.

The main deck is constructed of 5/16-inch wrought iron plating throughout, with wrought iron rivets. The main deck plating is finishel flush with double riveted butt, and single riveted seam straps on the under side. No wood decking is fitted.

These vessels are, generally speaking, of the large powerful tugboat type. The general arrangement is shown in the accompanying inboard profile. The engine room is located just aft of amidship. The main propelling motor is located aft. The crew's and officers' quarters are located under the main deck forward.

Principal Particulars

Coast Guard Harbor Cutters

Names....Hudson, Calumet, Navesink, Tuckahoe	
Builders .....Hudson, Navy Yard, Portsmouth, N. H.; Calumet, Navesink and Tuckahoe, Navy Yard, Charleston, S. C.	
Owner .....United States Coast Guard	
Launched .....Hudson, Oct. 5; Calumet, Navesink, Tuckahoe, Sept. 28, 1934	
Completed .....Hudson, Oct. 29; Calumet, Nov. 15; Navesink, (abt.) Dec. 15; Tuckahoe, (abt.) Jan. 15, 1935	
Length overall, feet, inches	110—6
Length between p. p., feet, inches.....	104—0
Beam molded, feet, inches.....	24—0
Depth molded, feet, inches.....	12—7
Draft, mean, feet, inches.....	9—1½
Draft, maximum (aft), feet, inches....	10—8
Displacement, loaded, tons (abt.).....	290
Propelling machinery, single screw, diesel electric drive, s.h.p. motor @ 250 r.p.m.	800
Generators, diesel drive, each 530 h.p.	2
Auxiliary generator, diesel, 15 k.w.....	1
Bunker fuel capacity, gallons (abt.)....	3800
Cruising radius, miles	650
Speed, designed, in knots	12

Passenger space is provided in the after end of the long steel deckhouse. In this house are also the galley, mess room and lavatories. The inspectors' room is located aft of the wheelhouse on the boat deck. Towing bitts are fitted on the main deck forward and aft.

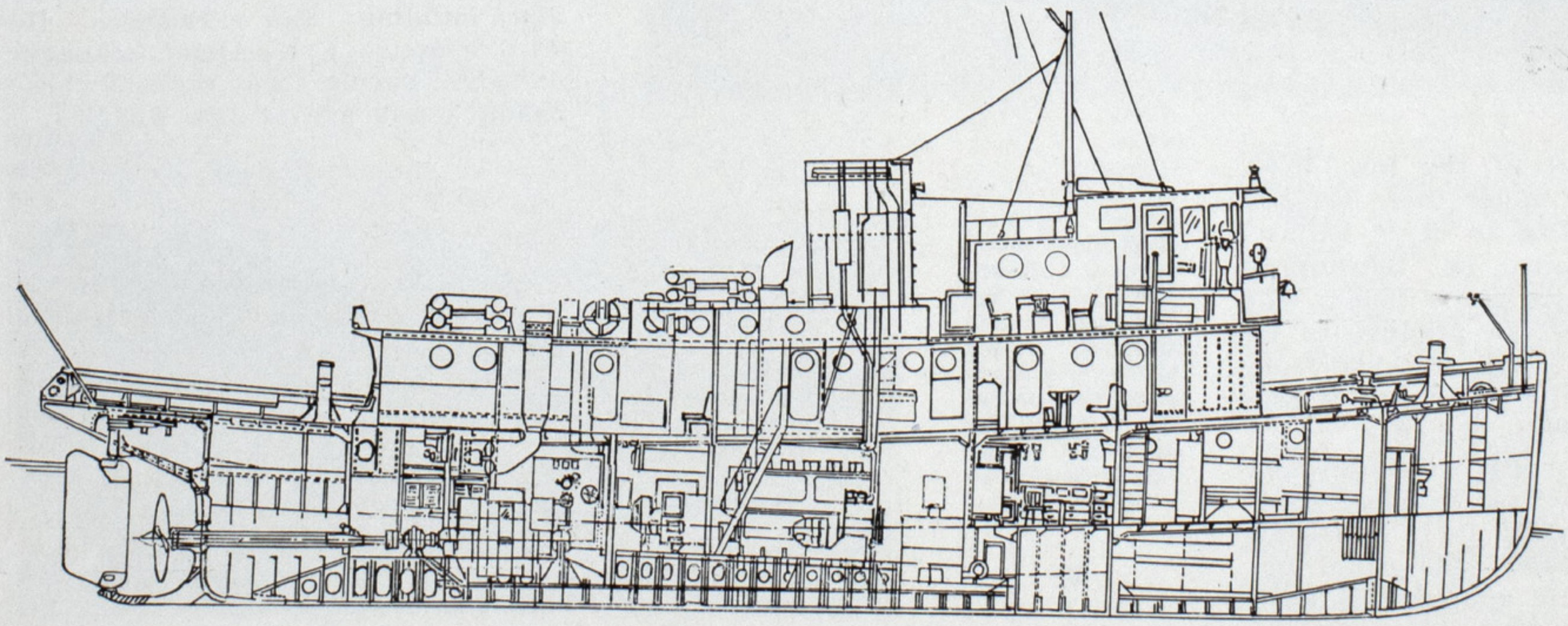
The steering gear is of the electro-mechanical type manufactured by the Sperry Gyroscope Co. The rudder is of balanced streamline type and is of specially strong construction to prevent damage should it take bottom when the vessel is maneuvering in confined waters.

No boats are carried on these cutters. Each vessel, however, carries two 25-person life floats and two 10-person life-floats.

Machinery Installation

Propulsion is by means of diesel electric machinery. Electric current for the propelling motor is supplied by two generators, each direct connected to a McIntosh & Seymour, 6-cylinder, 4-cycle, single acting, trunk piston diesel engine, of 12½-inch bore by 13-inch stroke, developing 530 brake horsepower at 550 revolutions per minute. These engines are airless injection and use an injection nozzle pressure of 3600 pounds. One engine is right hand and the other left-hand, each turning outboard, with the exhausts inboard and the starting controls forward. Regulation of the engines from no load to full load is possible within 3 per cent of normal speed.

Direct connected, to the aft end of the main engines, the main generators, of General Electric Co. make. are each of 325 kilowatts capacity at 550 revolutions per minute, 1300



INBOARD profile of the diesel electric Coast Guard cutters, Calumet, Navesink, Tuckahoe and Hudson. The first three were built at the Navy Yard, Charleston, S. C. The Hudson was built at the Portsmouth, N. H., Navy Yard

amperes, 250 volts, at full load. They are separately excited from a 120-volt exciter. There are two exciters, driven by the main engines through extensions of main generator shafts. They are of the open, direct current, constant voltage, compound wound type, and are self-excited. They each develop 25 kilowatts at 120 volts and supply excitation for the propelling motor as well as the main generators and also provide current for the vessel's lighting. Only one exciter is on at a time.

The main propelling motor is direct connected to the propeller shaft through a Timken roller bearing thrust block. There is a minimum length of shafting as the propelling motor is located aft. It is an open, direct current, shunt wound, double armature motor, separately excited at 120 volts. Each armature develops 400 brake horsepower at 1285 amperes, 250 volts, and 250 revolutions per minute. This motor, which is also supplied by General Electric Co., is of specially rugged construction to withstand the shock of sudden stopping due to the propeller striking ice or driftwood. It has two separate field frames. Either armature can be disconnected from the propulsion circuit in case of emergency.

Auxiliary Equipment

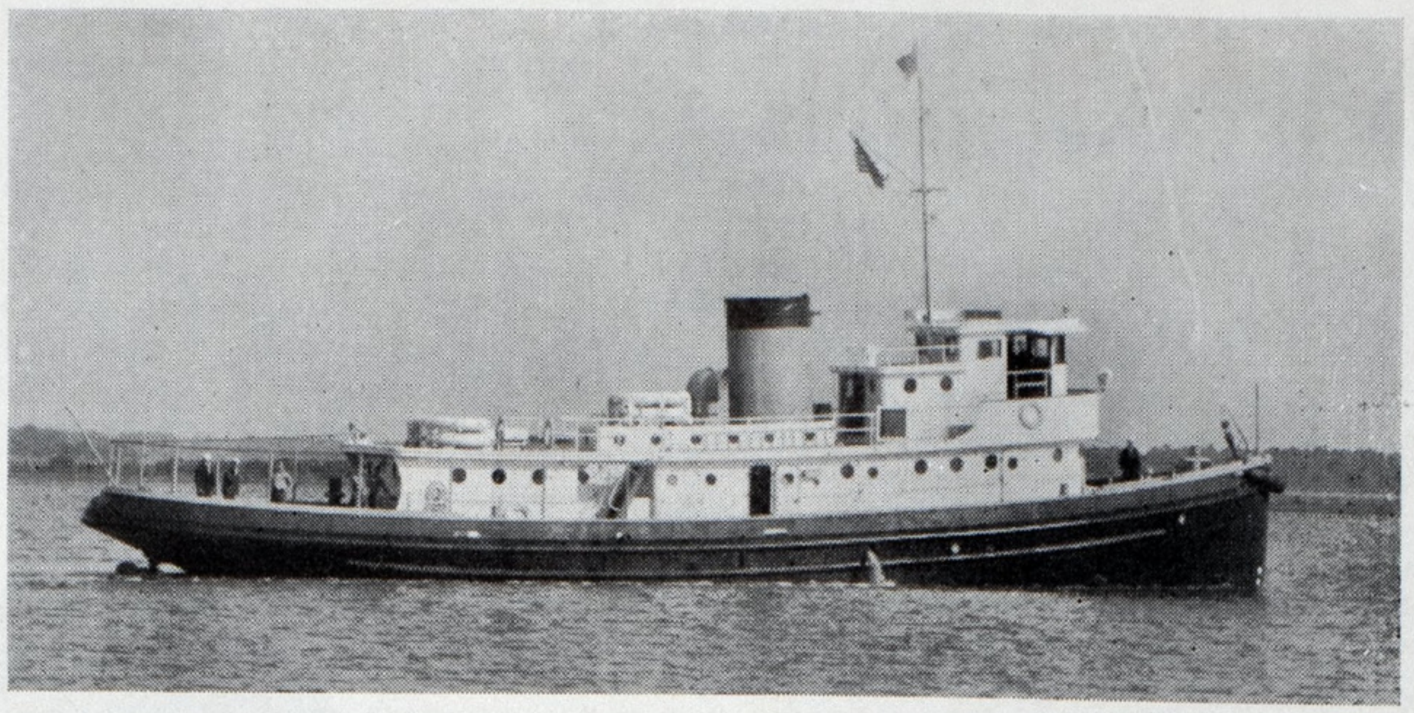
Each vessel is provided with a motor generator so that direct current for lighting and power may be available by running the machine with alternating current from shore. It is a squirrel cage, 3-phase, 60-cycle, 220/440-volt, 1800 revolutions per minute, 25 horsepower motor. The attached direct current generator delivers 15 kilowatts at 120 amperes.

One auxiliary, diesel driven generating set is installed on each vessel. The engine is a 2-cylinder, 5½-inch bore, by 9-inch stroke, 26-horsepower, 600 revolutions per minute, McIntosh & Seymour diesel. The generator made by the General Electric Co., has a capacity of 15 kilowatts, 125 volts, 120 amperes, and is compound wound.

A small oil burning boiler is installed on each vessel to supply steam for the steam heating system. The propellers were made at the navy yard at Philadelphia. There are two General Electric refrigerators. The windlass is of the hand capstan type.

A full line of pumps for various purposes are fitted as follows: one each for fuel oil service and transfer, one for lubricating oil, one fuel oil hand pump, one motor driven sanitary pump with hydro-pneumatic tank controls, one fresh water pump with hydro-pneumatic tank controls, and one motor driven fire pump.

Other auxiliaries include; four maneuvering air bottles; one motor driven air compressor; one motor driven ventilating fan for main motor; three bilge eductors, two of which are in the engine room; one fuel oil purifier; one lubricating oil purifier; three spark arrester silencers; two drinking fountains; and one air signal horn with tank compressor motor and control.



Single screw, diesel electric, harbor cutter Calumet, for the Coast Guard

General Electric Reviews Marine Activities

In summarizing the activities of the General Electric Co. during 1934, in the review prepared by John Liston, the following interesting reference is made to marine equipment:

In connection with the government naval building program, there were constructed equipments consisting of turbine-gear propelling machinery of an advanced design for destroyers, auxiliary turbine generator sets, motors and control for numerous auxiliaries, searchlights, radio, ordnance control, switchgear, and miscellaneous apparatus.

Diesel electric propelling equipments and electric auxiliaries were provided for four United States coast guard harbor cutters.

The completion of designs for the use of alternating-current motors to meet practically every navy shipboard requirement made possible the first practical installation of this type on the U. S. S. FARRAGUT.

The advantages that the substitution of alternating-current auxiliaries offered over those of the direct-current type comprise simplified design for the synchronous generators, the squirrel-cage induction motors, and the motor starters and a notable reduction in the weight of the electric equipment particularly cable which is especially important in marine equipment. The simplicity in design thus secured will tend toward greater reliability in service and will undoubtedly effect a reduction in maintenance expense as compared with that of previous equipments.

Before the substitution could be made, however, there were two major difficulties to be overcome. In the first place, there was the question of such adjustable-speed applications as the steering gear, the anchor windlass, and certain kinds of deck machinery which required direct current. Secondly, a certain amount of direct current was essential for searchlights and battery charging equipment.

The adoption of electro-hydraulic systems, employing constant speed motors, solved the first problem. The second was overcome by adding a small direct-current generator to the ship's turbine generating set. This generator also supplies excitation for the synchronous generators. Motor generator sets give direct current.

Navigation Methods Giving Formulas and Examples

Navigators will be interested in a chart recently published and distributed by the United States Hydrographic office as a supplement to the North Atlantic pilot chart, 1934.

On this chart, 29 different methods of navigation, from 1763 to the present time, are tabulated, listing author, publisher, title and date for each method. Given also are the formulas used, the general description of the method with an example common to each method, an analysis of the steps in the solution, the rules for the method and notes on the advantages and disadvantages in each case.

No originality is claimed for this work, it being only a matter of research.

The tabulations are entitled *Resume of Navigation Methods*, by Soule and Collins, copyrighted by the United States Naval institute, Annapolis, Md., and reprinted by permission of the copyright owner, Capt. C. C. Soule, U. S. N., is in command of the U. S. S. NEW MEXICO.

MACHINERY

for Cutters Algonquin, Comanche, Mohawk

BY HAROLD ANDERSON

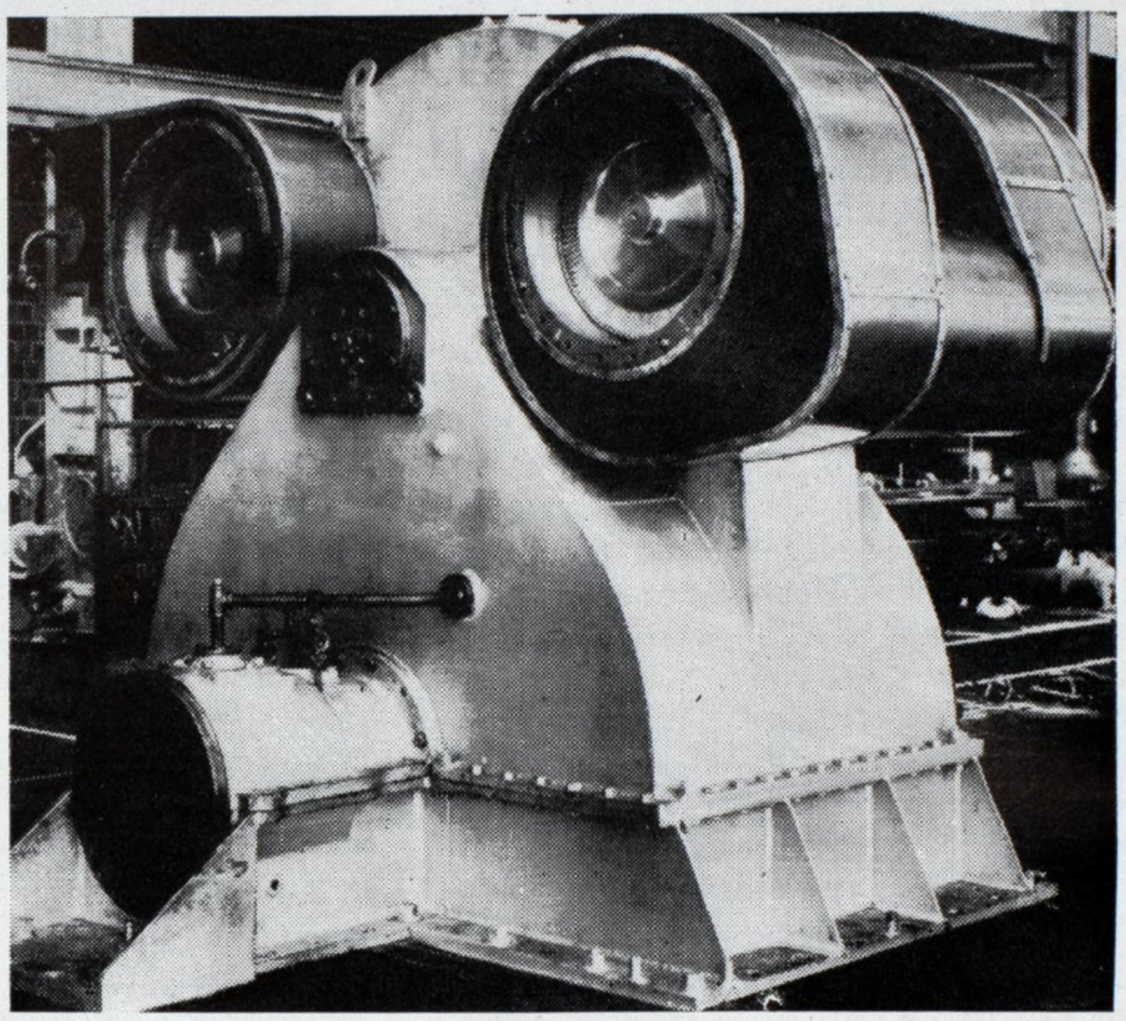
IT IS only within the last few years that geared turbines have been applied to such vessels as tug boats, patrol boats and salvage boats. The first tug boat to use such propelling equipment was the HARRY B. WILLIAMS, built in 1931 by the Manitowoc Shipbuilding Corp., for the Great Lakes Dredge & Dock Co. The geared turbine unit for this vessel was designed and built by the Westinghouse Electric & Mfg. Co. and was to a certain extent, based upon the very satisfactory results of somewhat similar equipments built by this company, during the war, for submarine chasers.

The units which were installed in the cutters ALGONQUIN, COMANCHE and MOHAWK built for the United States coast guard service at the yards of the Pusey & Jones Corp., Wilmington, Del., embody all the experience gained in the design, construction and operation of the previous propelling units of this type. A few of the outstanding advantages of this prime mover will be considered in this article.

The unit is self-contained in that the turbines, pinions and gears are supported by the gear case, thus permitting a very simple foundation. Any effect of misalignment caused by distortion of the ship is eliminated, except, of course, in the case of the low speed gear shaft which, in such case, is alone affected.

By this arrangement a compact construction, requiring minimum space and having minimum weight is possible. In spite of the compact arrangement, the unit is very accessible.

The pinions are short and stiff and are of ample size to take care of the inertia effect caused by quick starting and stopping. Bearing loadings and stresses are symmetrically distributed. In fact one of the governing factors in designing this unit was to make it capable of successfully withstanding any abuse resulting from cold starting and rapid and severe maneuvering.



MAIN propelling turbine of impulse type, with double reduction gearing, used in the single screw Coast Guard cutters Algonquin, Comanche and Mohawk. Full power ahead, 1500 S.H.P. at 140 R.P.M. Astern turbine designed to develop 1500 S.H.P. at increased steam rate

The condenser is mounted transversely, and the exhaust trunks are bolted directly to the turbines without expansion joints. Expansion is taken care of by mounting the condenser on transverse vertical plates, which provide a sufficient amount of flexibility.

A propeller type circulating pump is built into the lower part of the inlet water chamber and its turbine drive is mounted on top of this chamber. This construction requires no foundation for the pump and saves an appreciable amount of floor space.

Main Propelling Turbine

A special design of impulse turbine is used, consisting of four wheels, one of these wheels being mounted on the extended end of each high speed pinion shaft. The ahead turbine consists of a two-row wheel followed by two single row wheels. Each wheel has a separate casing supported by the gear housing, and each casing is connected in series by cross over piping. The astern turbine consists of a single two-row wheel exhausting direct to the condenser.

The ahead turbine is designed to develop 1500 shaft horsepower at 140 revolutions per minute when supplied with steam at 300 pounds gage, 200 degrees Fahr. superheat and 27½ inches vacuum. A hand valve also permits efficient operation at 500 shaft horsepower and 100 revolutions per minute. The astern turbine is designed for 1500 shaft horsepower at an increased steam rate.

All turbine cylinders are made of cast steel and are split to facilitate inspection and assembling. The lower half of each cylinder is bolted to the gear housing with a dowel fit. The nozzle chambers are cast integral with the cylinders and have the nozzles bolted on.

The turbine blades are fastened by a tongue and groove arrangement and pins which are carefully fitted into reamed holes. Each blade is machined to form its own shroud and has a carefully machined shank at the other end to provide correct spacing.

Where the shafts pass through the turbine casings, carbon glands are fitted. Each gland has three rings and steam at ten pounds gage pressure is used for sealing purposes.

Main Reduction Gear

The main reduction gear is of the steeple, double reduction type, having double helices with standard involute teeth. The entire gear train consists of two high speed pinions,

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The author, Harold Anderson, is a member of the Marine Engineering Department, Westinghouse Electric & Mfg. Co., South Philadelphia Works. For a complete illustrated description of these new Coast Guard cutters and sister vessels the reader is referred to the October, 1934, issue. Results of standardization trials of the ONONDAGA and the ALGONQUIN will be found in the November and December, 1934, issues, respectively.

which carry the turbine wheels on the extended ends as previously mentioned, one high speed gear mounted between the two helices of the slow speed pinion and a slow speed gear.

Welding has been used to a great extent in the construction of this gear. The only castings of any size are two steel frames, one of which carries the forward journal bearing and the Kingsbury thrust bearing, and one which supports the aft gear shaft bearing. With this exception the gear housing is made of all welded construction. The gear wheels are built up by welding.

The main propeller thrust bearing which is mounted at the forward end, is of the Kingsbury six-shoe, leveling plate type. It is of ample size for the heavy service for which it is intended.

Control of the propelling turbine is carried out by an overspeed valve and two hand operated maneuvering valves, one for ahead operation and one for astern. The overspeed valve is operated by oil pressure supplied from the main lubricating oil system, and regulated by a small governor impeller which is built integral with the high speed pinion and is located in one of the bearings.

If the turbine speed increases above a certain value, the oil pressure from the governor impeller actuates an oil relay, which in turn admits oil under pressure to the oil cylinder mounted below the overspeed valve. This starts to close the valve, and at a predetermined higher speed will close it entirely. As soon as the speed drops, the valve opens again. This type of governor has been fitted in a large number of units, is practically fool-proof and requires only a small amount of maintenance.

The overspeed governor valve is so arranged that should oil supply fail, the steam to the main propelling unit will be shut off. In addition, the usual arrangement of low oil level alarm is fitted.

Lubricating Oil Pumps, Coolers

To supply lubricating oil and the oil required to operate the main turbine overspeed valve, two vertical motor driven centrifugal pumps are furnished. One of these pumps is a standby unit.

These pumps are of the submerged suction type and are placed one on each side of the propeller shaft in the oil sump tank, which is located aft of the gear case.

The designed capacity of each pump is 100 gallons per minute against a total head of 60 feet. Each driving motor has a capacity of five horsepower.

Two oil coolers, each of 35 square feet cooling area, are mounted on the port side of the main reduction gear. The cooling water is supplied from the main circulating pump. The coolers can be operated singly or in pairs as required.

As mentioned previously, the arrangement of the main condenser is somewhat unusual in that the main circulating pump is mounted in the inlet water box, and in addition, the air ejectors with inter and after condensers are carried on the condenser shell. The condenser shell is of welded steel construction and the water chambers are of cast iron. The tubes are rolled in at one end and have metallic packing at the other.

Steam enters the condenser from the side and ample space is provided for its distribution over the tube surface. The air offtake connection is located adjacent to the water inlet end, below a baffle.

Of single pass type, the condenser has a total tube surface of 1080 square feet. Outside diameter of the tubes is ⅝ inch, and the active length is 11 feet. The material is cupronickel. The condenser is designed for 27½ inches vacuum when supplied with 75 degrees Fahr. injection water.

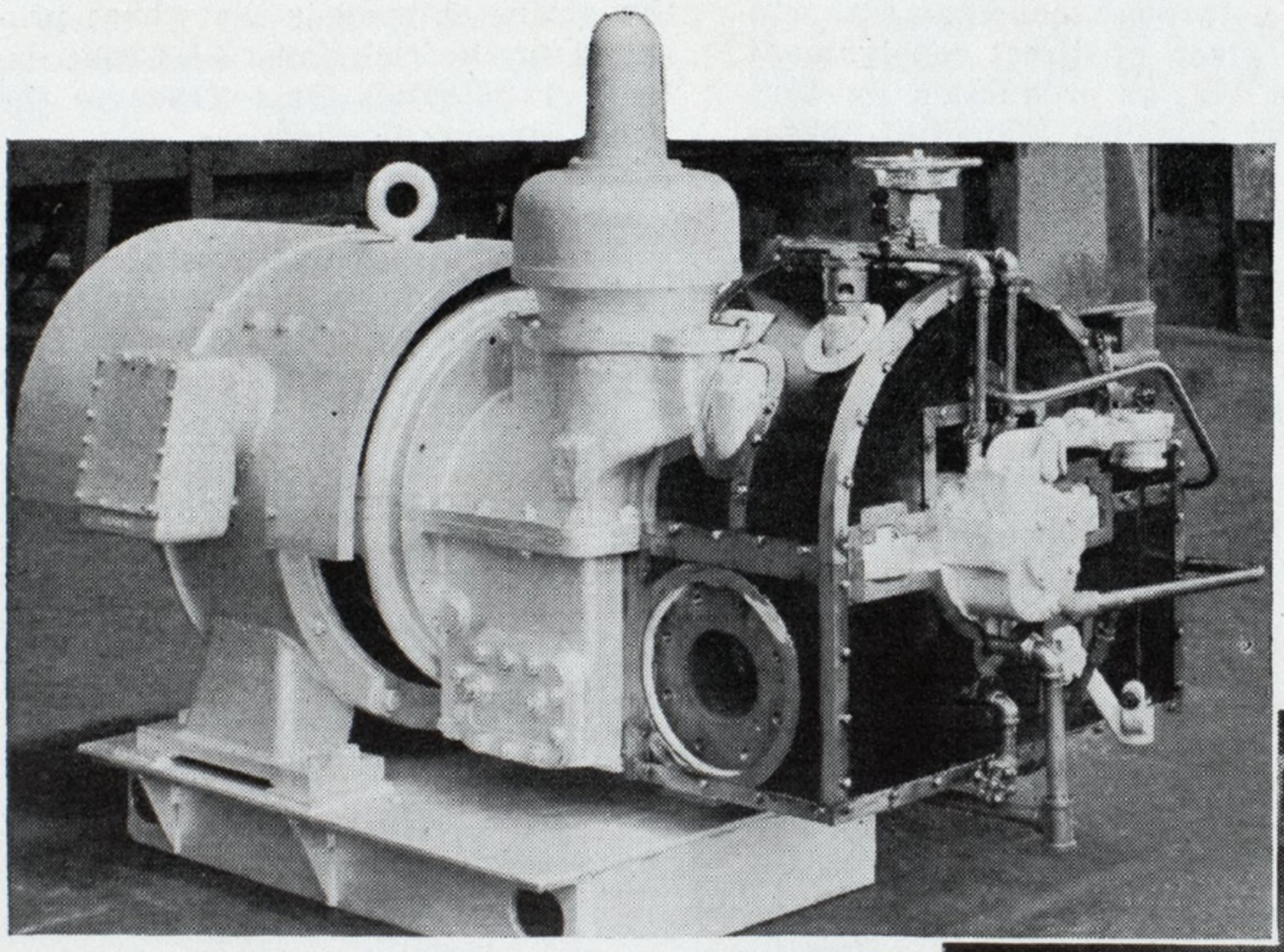
Main Circulating Pump

The circulating pump unit consists of a propeller type pump driven by a high speed turbine through a single reduction gear. It is designed to deliver 4400 gallons per minute against a total head of 15 feet. The pump is mounted in the lower part of the condenser inlet chamber and its turbine drive is placed on top of the water chamber.

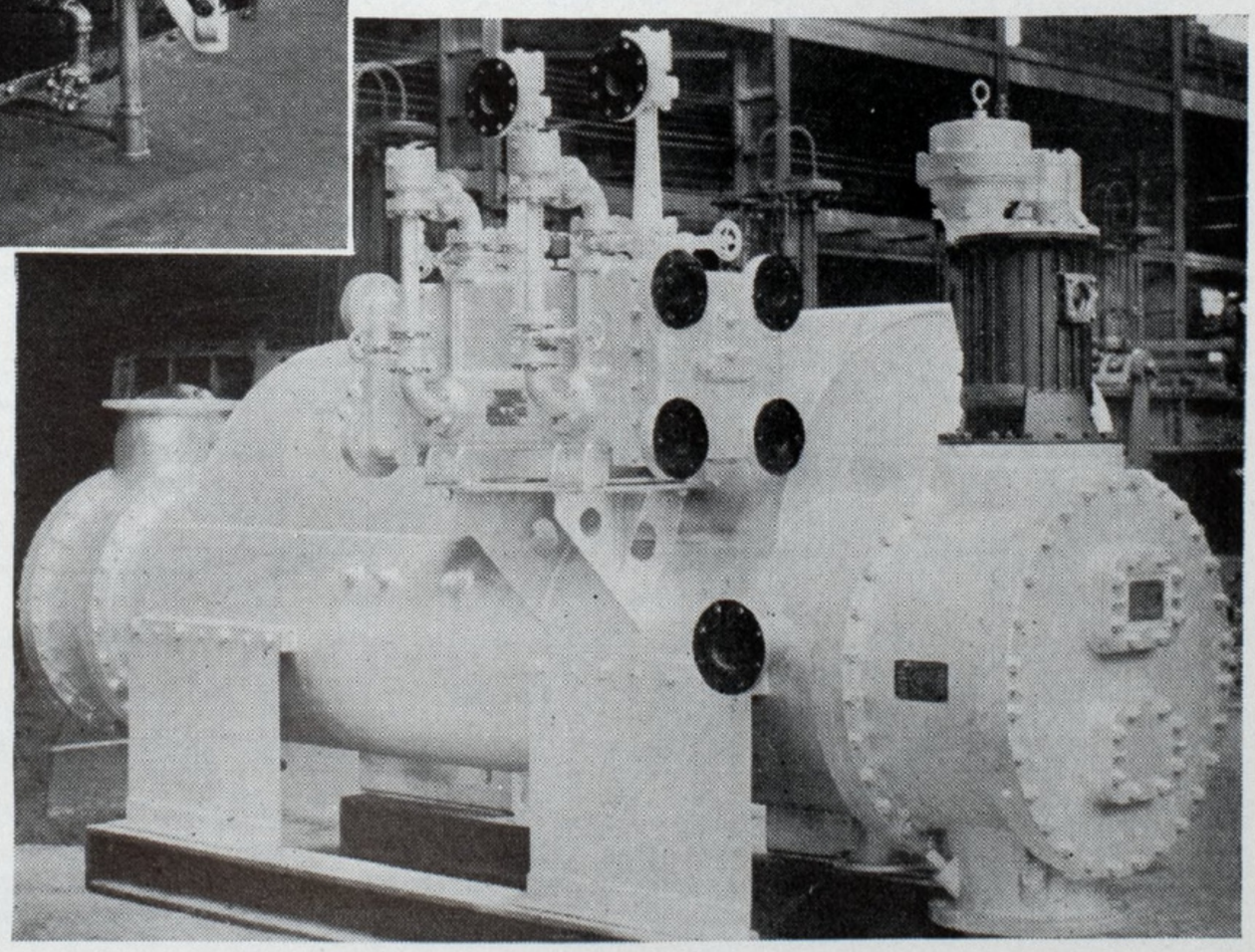
Mounted on the lower end of a vertical drive shaft, the pump runner is secured by a key and streamlined nut. Immediately above the runner are stationary guide vanes which direct the flow and prevent undesirable turbulence. The outer rim of the guide vanes is shaped to form a diffuser which converts the velocity head into pressure.

The pump bearing is made of rubber and is water lubricated.

(*Continued on Page* 40)



ABOVE—Geared turbine drive, 35 kilowatts, direct current generator set. Two of these sets installed in each of the three coast guard cutters



AT RIGHT—Main condenser of welded steel shell and cast iron water chambers, of 1080 square feet tube surface, installed on the Algonquin. Similar units in the Comanche and Mohawk

GRAIN TRANSPORTATION

On Great Lakes, Freight Rates and Volume

By A. T. WOOD

TRANSPORTATION rates for the movement of bulk freight on the Great Lakes are unregulated and, therefore, presumably fluctuating in character. But however unregulated this commerce appears to be, there is a noticeable measure of stability, as is attested by the regularity of the rates for coal and ore over a long period of years, graphically shown in Fig. 1.

Only in the movement of grain does the relative stability of the rates seem to be affected to any serious degree by the free play of competition between the various classes of carriers and between the ships of the United States and those of Canada.

This is in part due to the method of marketing grain, which does not permit of long term or yearly transportation contracts, as in the coal and ore trades, and by which the stability in the latter trades is largely obtained. Particularily severe has been the competition for eastbound grain cargoes since the tremendous shrinkage in the ore movement following the season of 1929. (See Fig. 2.) Yet the first indication of a declining grain rate appeared as far back as 1926.

In 1932 the tendency towards lower grain rates was further aggravated by the signing of the British economic conference treaty. This treaty calls for a six-cent per bushel preferential traiff on Canadian grain exported to the United Kingdom, in British bottoms, if the grain is shipped on a through consignment, and proof is given of direct consignment from, as well as production by Canada. For instance, Canadian wheat shipped via a United States Atlantic port with storage en route at Buffalo, is not, apparently, eligible for the preference. The effect of the preference, therefore, has been a marked decrease in the amount of Canadian grain shipped in vessels of the United States. (See Table I.)

The relative importance of the five Lake shipping ports and the various types of grain shipped is shown in Table II. Roughly 70 per cent of all the grains shipped is the wheat produced in the rich farm belt that extends 1800 miles from Texas to the Peace river in Canada.

TABLE II

Grain Shipments from Western Lake Ports, 1933

(Millions of Bushels)

	Lake Superior		Lake Michigan		
	Fort William	Duluth	So. Chicago	Milwaukee	Manitowoc
Wheat	155	43	7	5	½
Corn	.....	6	37	8	1½
Oats	12	4	7	1	¼
Barley	4	4	....	....	.....
Rye	2	3	½	....	.....
Flaxseed	1	2	....	....	.....

TABLE I

Shipments of Grain from Fort William—Port Arthur, Ont.

(Millions of Bushels)

Year	United States Ships		Canadian Ships		Total	Per cent in
	Cargoes	Bushels	Cargoes	Bushels	Bushels	U. S. Ships
1933	105	28	922	146	174	16
1932	173	48	971	149	196	24
1931	254	73	824	117	190	38
1930	422	97	601	113	210	46

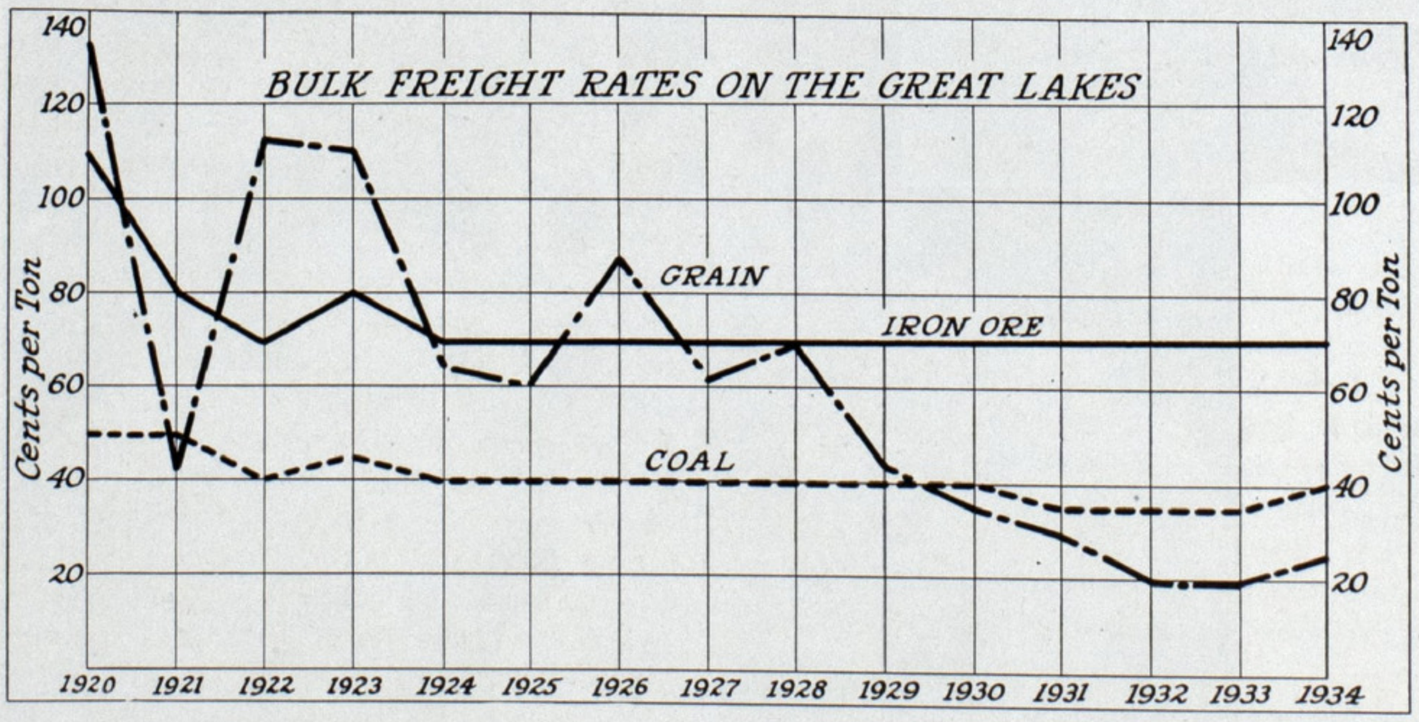


Fig. 1—Freight rates, cents per long ton (2240 lbs.), for iron ore, and for coal, cents per short ton (2000 lbs.). Grain rates estimated from Canadian statistics (weighted average), converted from cents per bushel to cents per short ton, allowance being made for loading and unloading charges

Exportable Surplus Grain

The surplus of this area competes with the exportable surplus of Argentine and Australia (next in rank as producers to the United States and Canada) and other smaller producers, in what is known as the world market. In reality the world market is Western Europe which imports some 600,000,000 bushels annually, of

TABLE III

United States Wheat Crops

(Millions of Bushels)

Year	Production	Consumption	Carry-over
1934	493	650	103*
1933	550	603	296
1932	720	700	400
1931	980	747	391
1930	890	765	332

*Estimated as of June 30, 1935.

TABLE IV

Wheat Production—U. S., Canada

(Millions of Bushels)

Year	United States	Canada	Combined
1934	493	254	747
1933	550	272	822
1932	720	428	1148
1931	980	321	1301
1930	890	421	1311

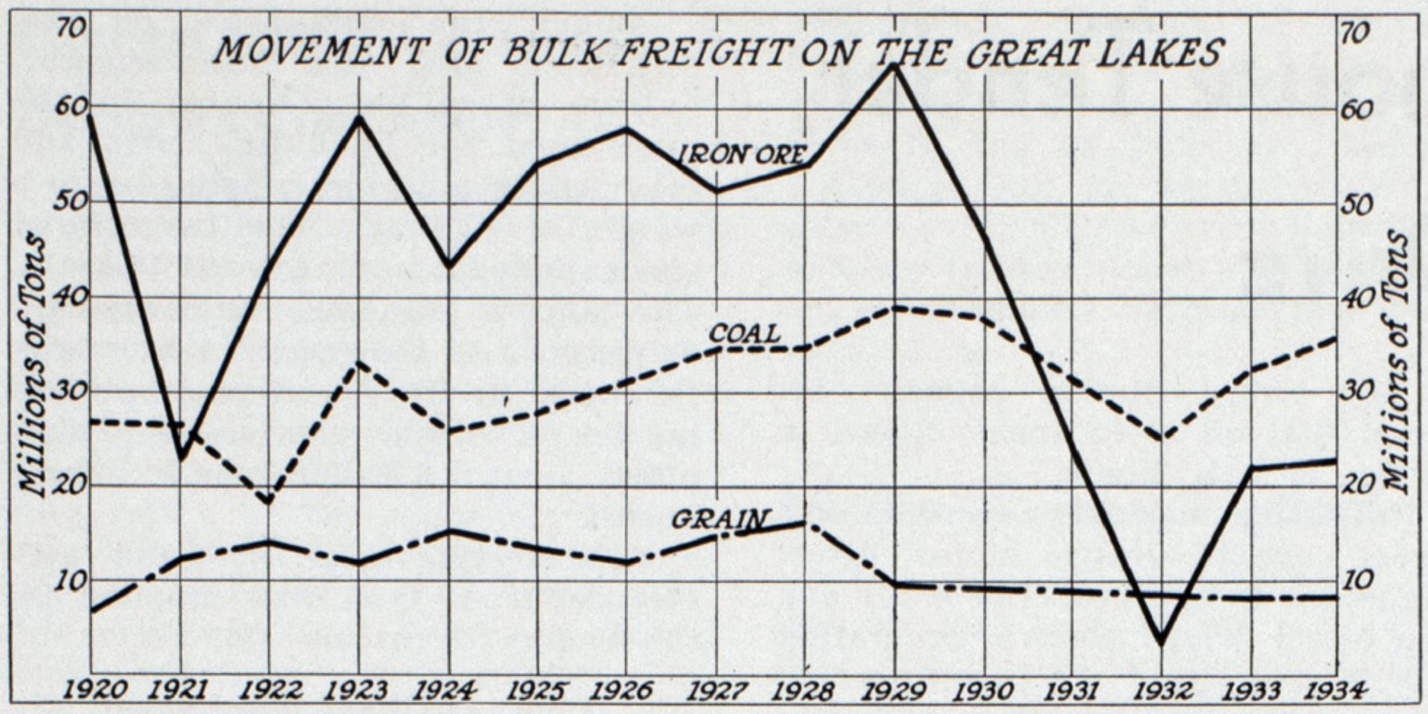


Fig. 2—Movement of iron ore, coal and grain on the Great Lakes during the past 15 years. Following customary practice, iron ore is given in long tons (2240 lbs.), coal and grain are given in short tons (2000 lbs.). The coal movement includes bunkers

TABLE V

World Wheat Estimates

(Millions of Bushels)

	1934 Carry-over	1934 Crop	Total Supplies	Domestic Requirements	Surplus or Carry-over
United States	260	493	753	650	103
Canada	193	270	463	106	357
Argentine	119	235	354	95	259
Australia	86	145	231	52	179

which the United Kingdom alone takes 200,000,000 bushels. France, usually an importer, has a surplus of 75,000,000 bushels.

Due to the severe drought and the government's efforts to curtail acreage, our exportable surplus, carried over from previous years, has been so reduced that we are no longer an important factor in the world market. (See Tables III, IV, V.)

The movement of export grain on the Great Lakes during the coming season will depend, therefore, largely on how much of the Canadian surplus can be sold abroad. But as has been pointed out, under the six-cent preferential, the movement, if it develops, will be mainly in ships of Canadian registry.

Eliminating the hope of an export market for ships of the United States, there is still to be considered the domestic movement and the possibilty of larger imports from Canada. This country is not only the largest producer but also the foremost consumer of wheat in the world, and the transportation of grain to meet the needs of the concentrated population centers of the eastern states alone, is an undertaking of some magnitude.

Although apprehension was felt that the loss of the Canadian export business would have a ruinous effect upon the receipt of grain at Buffalo, this port continues to be pre-eminent as a distribution point for domestic shipments. Being the leading milling center, with an annual consumption of 50,000,000 bushels, as well as the western terminus of the New York State Barge canal, it is unlikely that her position will ever be seriously threatened. (See Tabes VI, VII.)

With the various facts in mind there does not apear to be any real cause for the drastic and unwarranted decline in the grain rate except competition between the carriers themselves. An increase in the grain rate of one cent a bushel would mean less than five cents additional in the manufacturing cost of a barrel of flour. An increase of one cent a bushel would mean the difference between a loss and a small profit to the carrier.

If operating costs cannot be met, the high standards of the ore carrying fleets cannot be maintained, nor provision be made for replacement of tonnage, which now averages well over twenty years of age. A higher and more stable grain rate must be obtained for the carrier solely or almost solely dependent upon grain for eastbound cargoes.

TABLE VI

Grain Shipments and Receipts At Buffalo

(Millions of Bushels)

Year	Shipments	Receipts	Percentage
1933	305	130	42
1932	315	141	44
1931	334	157	47
1930	346	181	52
1929	351	172	49
1928	575	280	48

TABLE VII

United States Grain Shipments And Receipts at Buffalo

(In Bushels)

Year	Shipments	Receipts	Percentage
1932	93,537,128	82,076,819	87.75
1931	97,586,633	83,586,460	85.66
1930	98,578,717	88,423,362	89.70

IT is impossible to reconcile or to justify the wide disparity in freight rates on iron ore, coal and grain on the Great Lakes for approximately the same length of voyage and service. The rates on iron ore and coal have been remarkably steady for years, at 70 cents a long ton for ore and 40 cents a short ton for coal, while the rates on grain have fluctuated from a high of $1.12 a short ton in 1922 to low of 21 cents a ton in 1934.

This is a serious matter not only for the vessel operator, who cannot, at these rates, meet his expenses, but also to the shipper whose momentary advantage is likely to affect adversely the quality of future service.

It would seem to be a modest proposal to suggest that since 70 cents a ton for ore has been found to be a fair rate, satisfactory to both the shipper and carrier, that the rates on coal and grain should be not less than 45 cents a ton or that the sum of the two should be 20 cents more than for a cargo of ore one way. Editor's Note

Call at London Allowed

Permission has been granted the Baltimore Mail line to amend its ships' sales and construction loan contracts to allow a call at London instead of Havre on alternate eastbound voyages. Announcement to this effect was made on Dec. 18 by James Craig Peacock, director of the shipping board bureau, department of commerce.

This announcement follows a public hearing held on Nov. 26 to enable the shipping board bureau to ascertain the views of other interested carriers, and of shippers and the general public in respect to the request of the Baltimore Mail line to make this change in its itinerary.

Frederic R. Harris announces the removal of his engineering office to 27 William street, New York City.

Tamarack, Lighthouse Tender, Diesel Electric Drive

THE new diesel electric lighthouse tender TAMARACK, built by Manitowoc Shipbuilding Corp., Manitowoc, Wis., for the bureau of lighthouses, department of commerce, was launched Aug. 21, and completed Nov. 20, 1934. Contract was awarded Dec. 13, 1933 at a price of $233,917, and called for delivery within 300 days at Detroit.

Of substantial all steel construction, with the bow reinforced and double plated for ice breaking, the TAMARACK is a single screw vessel designed for handling supplies for lightships and lighthouses. A 10-ton derrick and cargo hoist are fitted for lifting buoys. Trimming tanks are located forward and aft.

Accommodations for 16 Men

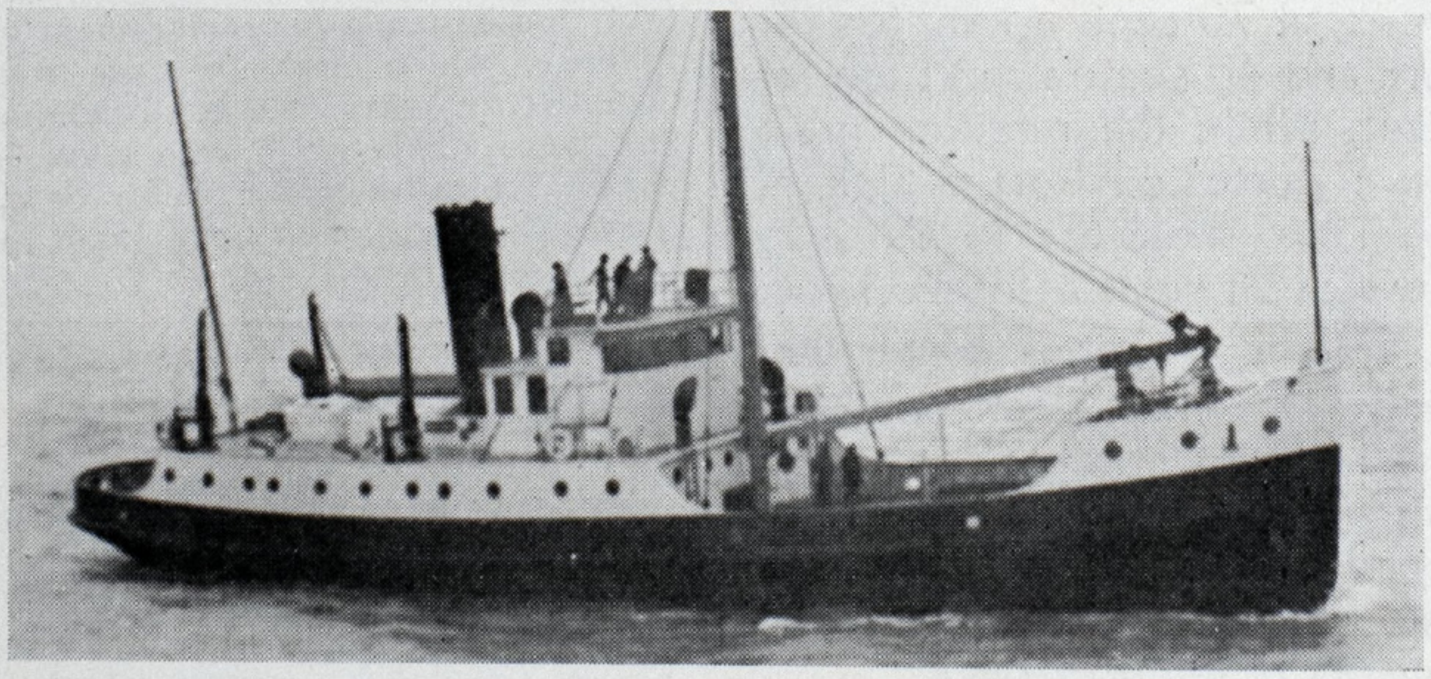
Accommodations are provided for a total complement of 16 officers and men. There is also a spare room for the use of the district superintendent of the lighthouse service.

Principal particulars are: Length overall, 124 feet, 2¾ inches; length between perpendiculars, 111 feet, 8 inches; breadth molded, 29 feet; depth molded, 10 feet; draft forward, 6 feet, 6 inches; draft aft, 7 feet, 6 inches; and crown of deck, 6 inches in 29 feet. The displacement loaded is 400 tons. Bunker capacity for diesel fuel oil is 45 tons. Speed in service is 10¼ knots.

Propelling machinery consists of a direct current electric motor, direct connected to the propeller shaft and two diesel driven electric generating sets for supplying the power for the main motor and auxiliary purposes. These generating sets have Westinghouse generators, each of 190 kilowatts capacity at 550 revolutions per minute, each direct connected to a 300 horsepower, 8-cylinder, 8½ inches bore by 12 inches stroke, 4-cycle, solid injection, Winton diesel engine. Each set has a 15 kilowatts direct connected exciter.

The double armature, propelling motor, also of Westinghouse make, develops 450 brake horespower at 400 revolutions per minute. It is of the open, direct current, shunt-wound type separately excited from the 125-volt excitation bus. This motor, also the main generators and the electric control equipment, were supplied by the Westinghouse Electric & Mfg. Co.

Auxiliary power is normally supplied from the exciters driven by the main generating sets but the vessel is also fitted with one 2-cylinder, 7½-kilowatt Winton diesel engine generating set.



Among the auxiliaries on the TAMARACK are: One 18-horsepower, 5-drum cargo hoist located in the main hold for handling buoys and other equipment and supplies up to a weight of 10 tons. This cargo hoist was supplied by Lidgerwood Mfg. Co. The anchor windlass and capstan, driven by a 10 horsepower motor, was furnished by the American Engineering Co. The same company also supplied one 6½-horsepower boat hoister.

The steering gear of hand and electric drum type was supplied by the Sperry Gyroscope Co.

Other Auxiliary Equipment

The pumping equipment of this vessel is quite extensive for her size, and includes one self-priming centrifugal, fire, deck and bilge pump of 120 gallons per minute capacity at 60 pounds head; one 10-gallons per minute, centrifugal, sanitary pump, and one 6-gallons per minute drinking water pump. All three of the above pumps were furnished by the Nash Engineering Co. There is also one 1 horsepower Viking fuel oil transfer pump.

Other auxiliaries include: A No. 3 air whistle and automatic whistle air compressor set furnished by Allan Cunnigham; one starting air compressor of 5 horsepower and 16 cubic feet displacement, furnished by Worthington Pump & Machinery Corp.; one coal fired heating boiler, supplied by the Almy Watertube Boiler Co.; and one galley range with Ray oil burner, supplied by Elisha Webb & Son Co. Refrigerator equipment of 18 cubic feet of food space and not less than 20 square feet of shelf space was supplied by the Kelvinator Co.

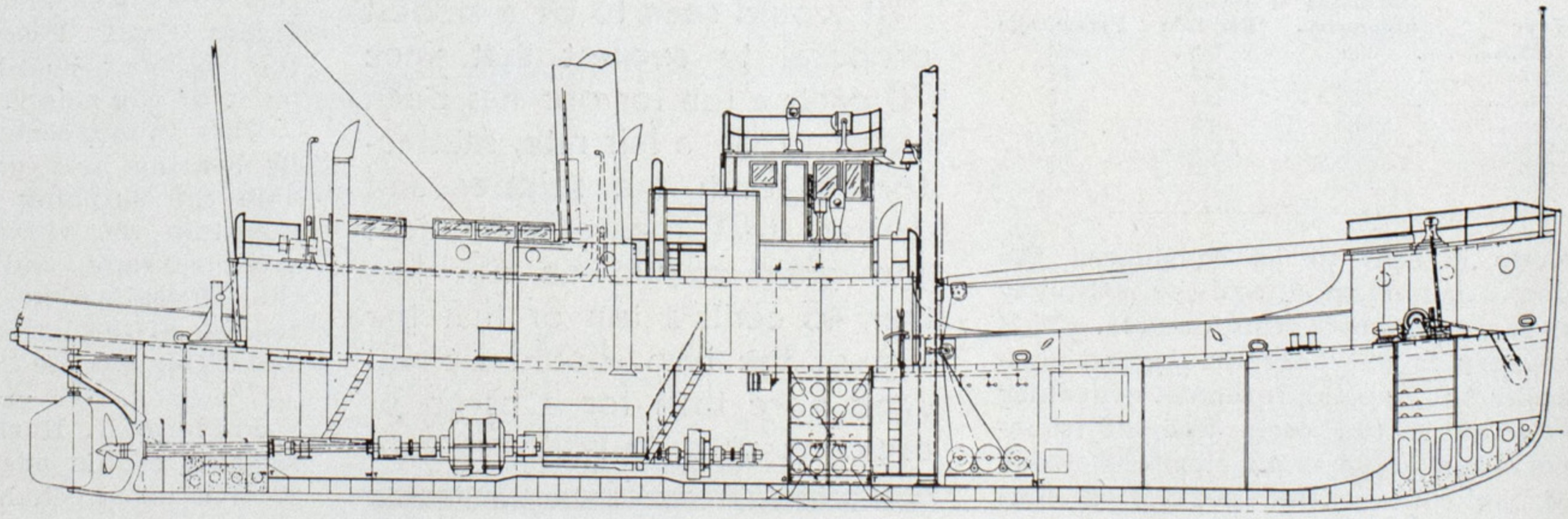
A new and completely revised edition of *Precautions and Safe Practices* is now being offered by The Linde Air Products Co., 30 East Forty-second street, New York.

Another valuable addition to oxy-acetylene literature is *Recommended Practices for Gas Cutting of Structural Steel*, also just recently issued by The Linde Air Products Co.

◆

SINGLE screw, diesel electric lighthouse tender Tamarack, completed Nov. 20, 1934, by Manitowoc Shipbuilding Corp.

◆



Highest Rating Given to Baltimore Line Ships

The highest possible rating has been given the Baltimore liners, CITY OF NEWPORT NEWS, commanded by Capt. Robert H. Wright, and the CITY OF BALTIMORE, commanded by Capt. Francis E. Cross, by observers from the United States navy placed on board the vessels to note their general safety and report to the steamboat inspection service in Washington. Officers of the navy sailed on these vessels during crossings from Europe to Baltimore, and their reports indicate that the ships, from the standpoint of a safety, are letter perfect.

Joseph B. Weaver, head of the inspection service, confirmed this report. "The navy men were placed aboard to observe the actual operation of the ship," he said. "They were to check on the discipline maintained aboard, the drill and other conditions. They report everything shipshape."

The placing of trained naval officers as observers aboard merchant ships was undertaken as a precautionary measure following the MORRO CASTLE disaster. The officers who traveled on the Baltimore line ships have the rank of lieutenat commanders. Before this work is completed every passenger vessel under the American flag will have had its observer on board during a regular run.

In a report made by Secretary of the Navy Swanson several months ago commenting on the qualifications of vessels operating under shipping board contracts he found that out of 298 vessels in this category, 58 were suitable for economical conversion into navy auxiliary ships. All five of the Baltimore Mail line fleet were included in the latter group.

A new fast freight service between Belfast, Northern Ireland and New York has been jointly announced by the Cunard White Star line and the Anchor line. The new service went into effect with the sailing of the ANTONIA from Belfast on Dec. 22, followed by the TRANSYLVANIA Dec. 29.

Sailings will be weekly with the ships leaving Belfast every Saturday. Arrivals in New York will be timed for early Monday morning one week later.

Marine Business Outlook

In a brief survey of the business outlook for 1935 R. B. Mildon, vice president, Westinghouse Electric & Mfg. Co., made the following encouraging statement concerning the marine field:

"The business outlook for marine propulsion equipment and electric auxiliaries is encouraging and there should be a substantial market for these products during the coming year, both in naval and merchant marine fields. This is due in large part to the expanded navy program which will doubtless stimulate an enlarged and improved merchant marine."

Maierform of America Inc., successor to American Maiershipform Co., has removed its offices to 25 West Forty-third street, New York City.

Los Angeles Traffic Up

Showing a gain of 50 per cent over both October and November of last year, foreign trade through Los Angeles harbor during last November reached 448,821 tons, valued at $11,981,234. Exports totaled 394,320 tons, valued at $7,362,393, while imports were 54,501 tons valued at $4,618,841. Exports for November 1933 totaled 267,933 tons valued at $5,228,273 with imports for this month 41,915 tons valued at $2,211,680; while for October, 1934, exports were 302,780 tons valued at $4,560,144 and imports totaled 41,205 tons valued at $3,295,494.

CAPT. GEORGE FRIED, recently appointed supervising inspector, second district, United States Steamboat Inspection, guest of honor at a dinner given by the Marine Exhibitors association on board the S. S. Manhattan, Nov. 30. At left, W. L. Faust, general manager, marine department, Socony-Vacuum Oil Co., greeting Captain Fried

Low Intercoastal Rates are Suspended by Board

On Nov. 28 the department of commerce announced through James Craig Peacock, director of the shipping board bureau, that, as the result of investigation and hearings conducted by the bureau, a number of tariffs, filed with the department by certain carriers, making drastic rate reductions in the intercoastal trade had been ordered cancelled.

The following carriers are affected by the suspension proceedings: Nelson Steamship Co., Pacific-Atlantic Steamship Co., States Steamship Co., Shepard Steamship Co., Argonant Steamship line, Panama-Pacific line, Grace Line, Weyerhaeuser Steamship Co., Pacific Coast Direct line, and Luckenbach Steamship Co.

Practically all of the proposed rate changes were filed as a result of the break-up of the United States intercoastal conference on July 31, 1934. The carriers in question, with the exception of the Shepard Steamship Co., and States Steamship Co. (a new line in the intercoastal trade), were members of the conference. The department found that except for some of the rates filed by the Shepard company, all of the proposed rate changes were unlawful. Two of the carriers affected, the Pacific-Atlantic Steamship Co. and the States Steamship Co. voluntarily cancelled their proposed lower rates during the course of the department's investigation.

Cites Shipping Acts

In its report and recommendations to the secretary of commerce, the shipping board bureau cites the requirement of section 18 of the shipping act of 1916, that carriers must establish and observe just and reasonable rates and tariffs, and finds that this requirement was not met by the schedules which have been disapproved. While the regulatory statutes do not define just and reasonable rates and tariffs, the report points out that the rates suspended are so low as to be unreasonable and that, if put into effect, they would defeat the intent of congress, as expressed in section 1 of the merchant marine act of 1920 (and reaffirmed in the merchant marine act of 1928), to develop and encourage the maintenance of a merchant marine adequate for the proper growth of our foreign and domestic commerce.

These acts require the department, in its administration of the shipping laws, to keep always in view this purpose and object as the primary end to be obtained. Furthermore, the bureau cites the requirements of the intercoastal shipping law, 1933, that rates and charges be explicit, and also cites the filing requirements prescribed under the law which the suspended schedules failed to meet.

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

A MUTUAL release signed by a seaman releasing the master, the owner, and the ship for all claims or charges for wages for the voyage is conclusive upon the seaman, seeking to recover wages, in the absence of fraud or coercion.—ABERDEEN, 7 Fed. Supp. 856.

* * *

IF A SHIP is unseaworthy in any material respect, the owner is not exempted from liability for damage to cargo even if the damage was caused by error in management. The owner of a ship on which cargo was damaged has the burden of proving seaworthiness, and any doubt must be resolved against him; the court must be convinced beyond at least a substantial doubt that the ship was seaworthy in order to find for the shipowner. Proper stowage of cargo is part of a vessel's seaworthiness, and proper dunnage is an element of proper stowage. By "dunnage" is meant the wood, mats, or other material used to keep cargo clear of the deck or hull of a ship. On deck, dunnaging is used also to facilitate drainage. It is highly important that dunnage boards should not "foul" the sounding pipes; that is, should not lie too close to the pipe and prevent the carpenter from taking his soundings in the proper way. In the case of INDIEN, 71 F. (2d) 752, it appeared that in dunnaging a cargo of lumber no attempt was made to compensate for the ships "sheer" and that the ship was overloaded, being loaded below the Plimsoll marks. The court held the ship to be unseaworthy, precluding exemption of the owner from liability for damage to the cargo caused by water entering through the sounding pipe when the cap came off.

* * *

AN AGREEMENT for the conditional sale of a vessel must expressly deny authority to the buyer to create a lien in order to exclude liability for liens created by the master, and an agreement to keep the vessel clear of liens did not preclude the buyer from creating voluntary liens which become prior to the seller's lien, it was held in the case of Munson Inland Water Lines v. Seidl, 71 F. (2d) 791. It was decided, further, that persons furnishing supplies or rendering salvage services to a vessel sold under a conditional sales contract were not required to investigate the master's authority, where the master had power to lien the boat for necessary repairs or salvage services. Persons furnishing services to obtain release of a stranded vessel under agreement for a fixed compensation payable regardless of success of their efforts were not entitled to priority of lien over other claimants having liens arising out of a single trip on the Great Lakes.

* * *

THE federal longshoremen's and harbor workers' act was designed to accomplish the same general purpose as the workman's compensation laws of the states, and congress intended to except from the benefits of the law only those persons ordinarily and generally considered as seafaring men, at least only those employed on board a vessel having a master and crew. The law was construed in the case of De Wald v. Baltimore & Ohio Railroad Co., 71 F. (2d) 810, where the court held that a bargeman whose duties were to check and supervise the loading and unloading of cargo and keeping a record, and who went home every night, and who was the sole worker on barges which were not navigated under their own power, was not master or member of the crew so as to preclude recovery for his death under the law above referred to.

* * *

AS USED in the navigation acts, the term "trades" is synonymous with "business". The trade or business of a vessel licensed for the coastwise trade is the transportation of freight and passengers for hire between ports of the United States. In order to ply her trade, she must engage in a voyage. Intention as to the ultimate destination of goods fixes the character of transportation, whether intrastate, interstate, or foreign. After the above generalizations, the court, in the case of United States v. Picou, 71 F. (2d) 854, decided specifically that a libel charging that a vessel licensed for the coastwise trade engage in a voyage with intent to transship intoxicating liquor from a vessel on the high seas and illegally import it into the United States sufficiently stated a case for the condemnation and forfeiture of such vessel for engaging in a trade other than that for which she was licensed.

* * *

CORPORATION, expressly contracting for the security of indorsed notes for a portion of the sum due it for materials and labor expended in repairing a vessel, without stipulating for the retention of a maritime line, waived a lien for the portion of the work paid for by notes, it was declared in the case of PRESIDENT ARTHUR, 72 F. (2d) 276. The shipowner's agreement in the contract for repairs to place no mortgage on the vessel before a date immediately after the contract time for payment and assurance in a subsequent letter to the repair company that no mortgage was contemplated held not to show such company's intention to rely on the credit of the vessel as security for the portion of the contract price paid by the notes.

* * *

WHILE a lighter moored to another lighter was bound to know the condition of and not overcharge such other lighter's fasts, the latter lighter, by accepting the added burden, might be charged with the duty to take reasonably necessary steps to prevent injury; but such duty did not excuse the former lighter's failure to use due care to see that the mooring did not cause the other lighter's lines to part during a subsequent storm. The moored lighter, to which the other lighter was tied, was not charged with the duty to take steps to prevent injury therefrom because of the storm until it became evident that the latter lighter was not taking required precautions, nor obliged to maintain a watch to determine such fact, and hence was guilty of no fault contributing to the collision between the lighters and another moored vessel after the lines broke.—TRENTON, 72 F (2d) 283.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	280	1,356,331	306	1,475,818
October	290	1,555,651	284	1,539,537
September	271	1,645,919	284	1,624,272
August	296	1,815,221	332	1,859,966
July	313	1,686,825	295	1,574,395
June	239	1,696,804	324	1,785,815
May	291	1,597,233	316	1,662,711
April	288	1,599,185	274	1,477,492
March	302	1,706,307	313	1,757,221
February	265	1,481,004	267	1,508,905

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	58	156,483	56	130,800
October	55	143,330	56	146,265
September	52	143,092	44	115,845
August	56	151,501	41	120,875
July	48	125,616	35	89,902
June	61	191,042	53	155,308
May	58	169,719	50	143,652
April	67	199,032	48	147,083
March	59	162,480	48	140,311
February	42	129,940	36	109,973

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1934	93	339,602	63	234,302
September	110	362,773	75	238,557
August	129	377,219	106	363,789
July	136	374,494	112	392,586
June	125	337,627	105	316,594
May	105	301,785	82	245,571
April	86	309,725	58	227,404
March	88	304,604	64	259,406
February	71	247,077	46	162,542
January	97	330,320	60	225,075
December, 1933	84	303,806	52	236,871

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	21	41,916	19	34,399
October	19	34,735	17	28,611
September	16	35,064	15	34,285
August	23	31,559	21	31,672
July	14	27,034	12	26,525
June	15	30,296	16	43,232
May	15	27,376	15	32.378
April	14	20,555	15	20,572
March	13	33,399	13	33,399
February	11	27,213	11	27,213

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	4	9,158	2	2,192
October	3	11,084	1	1,901
September	4	13,022	2	8,628
August	7	12,240	5	11,809
July	4	11,634	4	17,821
June	8	14,773	4	4,887
May	3	4,985	1	2,022
April	3	4,985	1	2,022
March	5	17,973	2	7,422
February	7	20,959	2	6,882

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	32	129,510	44	165,914
October	27	104,387	47	182,669
September	22	83,223	41	147,290
August	30	119,182	49	194,079
July	12	46,946	11	39,730
June	10	34,726	1	2,298
May	11	41,765	17	58,993
April	31	117,094	42	157,954
March	32	121,085	50	186,817
February	25	95,774	52	198,593
January	32	116,610	50	188,401

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	88	271,778	94	288,109
October	96	282,930	100	308,916
September	91	276,111	93	284,297
August	92	278,812	96	280,641
July	108	319,702	106	317,583
June	108	339,280	112	356,445
May	104	329,312	107	328,998
April	102	300,396	108	334,583
March	92	288,061	88	273,131
February	77	261,122	77	263,236
January	78	256,942	80	265,681

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	32	121,636	45	113,181
October	28	83,089	41	102,699
September	26	67,068	44	107,698
August	21	111,553	37	113,616
July	25	76,320	33	91,111
June	39	91,293	57	127,068
May	31	71,706	50	103,737
April	21	65,701	47	125,291
March	23	64,469	60	151,360
February	16	47,708	41	102,933

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	20	29,468	13	25,052
October	13	22,913	17	32,357
September	18	21,329	18	24,657
August	20	25,558	21	37,676
July	18	16,470	16	18,145
June	16	21,226	18	30,898
May	14	13,340	22	38,824
April	10	10,464	7	12,164
March	9	16,338	9	11,193
February	8	10,900	11	20,348

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	24	30,272	27	32,493
October	26	26,491	25	26,899
September	21	23,268	21	23,282
August	23	24,392	24	24,706
July	25	24,469	25	25,564
June	28	33,701	25	32,548
May	40	57,180	42	58,094
April	28	36,197	21	36,066
March	24	38,052	23	37,658
February	23	36,476	24	36,523

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	89	201,492	95	222,543
October	109	278,352	107	266,966
September	102	228,304	115	260,544
August	108	256,663	101	237,852
July	102	221,011	99	225,308
June	119	254,040	115	237,054
May	115	255,503	114	253,294
April	113	254,839	103	239,371
March	115	275,629	129	309,123
February	115	268,707	112	251,232

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	46	185,293	48	205,795
October	54	230,438	55	222,014
September	45	184,361	43	221,241
August	43	176,644	54	223,038
July	24	93,558	20	82,646
June	16	73,128	12	52,309
May	22	103,441	19	86,295
April	62	264,608	67	278,172
March	52	203,796	51	205,371
February	54	226,118	62	251,281

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1934	175	499,832	177	492,802
September	159	453,453	157	426,341
August	145	385,557	154	403,163
July	156	439,297	154	423,642
June	141	300,349	151	416,734
May	167	482,123	152	421,839
April	169	487,655	170	475,121
March	155	422,855	166	449,394
February	151	446,952	145	414,515
January	146	423,759	145	414,918
December, 1933	139	398,112	152	443,496

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	43	128,750	39	112,755
October	47	165,814	37	105,739
September	35	102,325	28	80,390
August	32	97,695	36	97,663
July	41	99,233	34	81,362
June	36	95,072	31	81,094
May	36	98,475	23	69,764
April	38	101,315	34	96,705
March	44	131,839	37	109,492
February	40	112,884	39	109,597

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	22	43,980	71	255,378
October	16	29,015	70	207,637
August	12	21,967	55	160,727
July	21	33,508	60	163,282
June	25	57,920	71	215,594
May	21	34,457	56	141,885
April	27	50,294	82	219,283
March	29	54,379	94	264,101
February	22	41,945	77	236,784
January	23	43,664	86	252,595

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	226	870,032	210	878,186
October	225	856,732	203	825,348
September	214	804,221	197	791,324
August	218	801,482	201	785,671
July	198	710,210	186	755,686
June	201	743,198	186	738,880
May	200	754,695	197	738,307
April	186	696,716	167	679,883
March	168	669,548	169	691,230
February	154	629,859	165	624,170

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	151	664,456	175	733,150
October	152	670,992	156	663,353
September	146	614,180	160	675,941
August	160	699,105	178	781,553
July	118	484,655	119	471,702
June	126	386,966	110	456,027
May	152	452,827	140	593,715
April	165	831,501	169	729,273
March	150	659,251	181	772,219
February	141	503,105	154	659,366

Houston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1934	39	143,055	39	139,616
October	43	145,461	41	139,418
September	49	169,676	49	170,694
August	19	76,104	22	88,631
July	24	93,810	24	86,702
June	27	115,730	33	133,108
May	29	109,223	45	132,318
April	31	121,318	40	155,327
March	23	89,200	39	144,546
February	22	88,094	26	99,931

Note: At the port of Philadelphia, additional vessels in the foreign trade (via other American ports) were 60 of 198,855 net tons entered and 65 of 224.954 net tons cleared for the month of November.

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Sales—Reconditioning—Launchings—Trial Trips

REPORTS are current that George G. Sharp, New York naval architect, has in preparation plans and specifications for three fast new passenger and cargo liners for the New York-Mediterranean service of the American Export lines. Speed, it is said, will be 20 knots, and accommodations will be provided for 300 first class passengers. Approximate length, it is believed, will be about 550 feet, and the gross tonnage, about 12,000. Ample cargo space will be provided.

No confirmation of this proposed program of new building is available, but it is understood that bids will be requested early in the new year, and that the vessels will be ready for service late in 1936.

The American Export lines now operates a fleet of 24 vessels, one of the largest controlled by any private American steamship company. The trade is between New York, Mediterranean and Black Sea ports. Mr. Sharp was the designer of the four new vessels of this fleet, EXCALIBUR, EXOCHORDA, EXETER, and EXCAMBION, built by the New York Shipbuilding Co., the last of which was completed in the summer of 1931. The first, the EXCALIBUR, was completed in December, 1930. These vessels are 475 feet, 4¼ inches in length overall; and have a beam of 61 feet, 6 inches. Passenger capacity in one class is 150. The deadweight capacity is 9298 tons. They had a speed on trial of 18 knots and have a sea speed of 16 knots.

It is universally recognized that they are popular and successful ships. Passenger accommodations are most attractive and comfortable without being ornate.

Bids for Diesel Engines

On Dec. 11 the United States engineer office, Louisville, Ky., received bids from eight diesel engine building companies for furnishing two 750-horsepower diesel propelling engines and one 575-kilowatt diesel driven generating set. The adjusted bids were as follows:

The Cooper-Bessemer Corp., Mt. Vernon, O., $112,490; McIntosh & Seymour Corp., Albany, N. Y., $114,060; Busch Sulzer Bros. Diesel Engine Co., St. Louis, $121,522; Nordberg Mfg. Co., Milwaukee, Wis., $124,366; Fairbanks Morse & Co., Chicago, $126,196; Ingersoll Rand Co., New York, $127,800; Winton Engine Corp., Cleveland, $133,631.25 and Electric Boat Co., Groton, Conn., $142,000.

Three of the companies also bid on one 1600-horsepower dredge engine, as follows:

Nordberg Mfg. Co., $53,986; Busch Sulzer Bros. Diesel Engine Co., $60,250; and McIntosh & Seymour Corp., $61,840. These three companies also offered a combined bid on the two propelling engines, the generating set and the dredging pump engine as follows: $172,781 from Busch Sulzer Bros. Diesel Engine Co.; $175,900 from McIntosh & Seymour Corp.; and $178,352 from Nordberg Mfg. Co. As this is written no award had yet been made.

To Ask for Fast Tankers

Unless the shipping board takes steps to aid private companies in the construction of fast tankers, suitable for naval auxiliaries, the navy department, it is understood, will include several tankers as well as other auxiliary vessels in its new naval building program, recommendations for which should be ready early in the new year.

A speed of at least 15 knots, and maybe as high as 18 will be required for such tankers. Without an adequate number of fast tankers the fleet could not operate effectively at long distances from its bases.

Ferry for Erie Railroad

Bids were to be received Dec. 18 for the building of the new ferry for the Erie Railroad Co., mentioned in the November issue of MARINE REVIEW. Plans and specifications have been prepared by J. W. Millard & Bro., 17 State street, New York.

It is understood that the specifications call for main propelling engines of steam reciprocating type, and steam to be supplied by oil-burning Scotch boilers. Shipyards, however, are being requested to offer alternate bids for different types of propelling power. The new vessel is to be 234 feet in length overall, 64 feet in beam over the guards, 18 feet, 6 inches in depth, and will be of the customary double ended type. She is to be used in the Erie railroad service, across the North river, between terminals at New York and New Jersey.

The Los Angeles harbor department because of rapidly increasing business for the McCormick Steamship Co. has called for bids for the construction of a 160-foot extension of the shed at Berth 177 occupied by this company. The first unit is to cost approximately $35,000 and when completed the shed extension and facilities will cost $55,000. The construction will be of steel and of the same modern design used in the berth as it now stands.

New Model Basin Needed

In the annual report of Rear Admiral E. S. Land, (CC) U. S. N., chief of the bureau of construction and repair, it is stated that a total of 70 war vessels of various types are now under construction or contract in private shipyards and navy yards. This program does not yet, however, provide treaty strength. Seventy-eight additional ships are necessary to bring the navy up to full London treaty strength in under-age vessels.

Admiral Land again vigorously urged that the necessary appropriation be made for an up-to-date model basin for experimental purposes. In this connection he said:

"Not a single up-to-date experimental model basin exists in this country today, in which respect other maritime nations have outstripped us. While the work being conducted at the present basin has been gratifying along certain lines, it is felt that the engineers and naval architects of this country are handicapped in the investigation of the complex problems that arise in the effort to improve efficiency of our vessels. It is hoped that this vital need of the navy department and of the country as a whole will be met by the allocation of funds to permit prompt undertaking of the construction of a new model basin, the plans and specifications for which have long been ready."

In connection with the education of naval constructors, the report emphasized the importance of having officers of the construction corps do postgraduate work abroad. He said:

"In line with the recommendations contained in the bureau's report for the last fiscal year that officers of the corps who showed special ability be assigned to postgraduate work abroad for period of one year, one such officer is at present studying in Paris. It is hoped that this practice may be continued, as it is considered a step toward the diversification of ideas and methods, and is manifestly beneficial."

Convert Collier Achilles to Self-Unloader

The American Steamship Co., Boland & Cornelius, Buffalo, managers, has purchased from the Panama Railroad Co. the collier ACHILLES for conversion to a self-unloader for the Atlantic coastwise coal trade. Generally the conversion will be similar to that of the J. F. SCHOELLKOPF JR. and CONSUMERS POWER (see MARINE REVIEW for October, 1933 and August, 1934).

The ACHILLES was towed from Cristobal, Panama Canal Zone, leaving there Nov. 10, to the Baltimore plant of the Bethlehem Shipbuilding Corp., Baltimore, where she arrived on Dec. 6. Work in converting the vessel commenced on Dec. 10 and it is estimated will be completed about April 1, 1935. Much of the fabrication of the steel required will be at the Sparrows Point plant with installation at the Baltimore plant.

Built in 1916 by the Maryland Steel Co., Sparrows Point, Md., the ACHILLES with her sister vessel ULYSSES (now a tanker in the bulk oil trade) were known as the Panama colliers. She is of very sturdy construction and is in excellent condition as she has been given the best of care during the nine years of her lay-up in Gatun lake.

General particulars are: Length overall, 536 feet; length between perpendiculars, 514 feet; breadth molded, 65 feet; depth molded, 39 feet, 6 inches; and original load draft, 28 feet, 1 inch. The propelling machinery is located aft and the total indicated horsepower, in two reciprocating engines applied to twin screws, is 7200 giving her a speed of 14 knots. Steam is supplied by three double ended Scotch type boilers 16 feet in diameter by 22 feet, 1 inch long, with a working pressure of 200 pounds per square inch. She is fitted for fuel oil burning.

A complete belt conveyor system, operating under two parallel lines of hoppers, will be installed, with A frame supporting a long boom, with belted conveyor located at the forward end for discharging over side. After conversion the ACHILLES will carry 10,000 tons of cargo on a draft of 25 feet. She will have an unloading capacity of 1400 long tons per hour.

Considerable general overhauling will be necessary but the hull is in good condition as is also the machinery. A good deal of additional machinery will be necessary including a 500 or 600-kilowatt turbine generator set supplying current for the necessarily large number of electric motors for driving the conveying machinery.

May Build New Liner

Though no confirmation is available, reports are current that the Matson Navigation Co. is considering the construction of another 23-knot liner for operation in its California-Australasian trade. At present the Oceanic line is operating the MARIPOSA and MONTEREY in this service. Before any definite action is taken, however, it is understood, the company is awaiting the outcome of the present mail pay investigation by the post office department and the formulation of the government's new program for merchant marine aid.

Since they entered service in 1932, the MARIPOSA and MONTEREY have been exceptionally well patronized. It is said that on their last 17 outward voyages they have carried full cargoes. Average passenger carryings, both outward and homeward has been over 400 for each voyage.

These two ships now operate on a four-weekly service from San Francisco, calling at Los Angeles, Hawaii, Samoa, Fiji Islands, Australia, and New Zealand.

Index for 1934

INDEX of the contents of the twelve issues of MARINE REVIEW *for the year 1934, covering all the editorial material which appeared, is now ready for distribution. Copies will be sent, on request, without charge, to those subscribers who have kept a complete file of copies and desire the index.*

Orders Diesel Machinery for U.S. Submarines

On Nov. 17 the navy department awarded contracts, totaling $3,948,-144.72, for 30 diesel engines to be installed in five of the six submarines now building under the 1934 program Twenty of these engines are large units for propulsion and ten are smaller units for auxiliary service, generating electric power for operating all equipment aboard the vessels.

Twelve of the large engines and six of the auxiliary engines were awarded to the Winton Engine Corp., Cleveland, for the sum of $2,142,764.72. These are for submarines Nos. 176, 177 and 178, to be named PLUNGER, PINNA and POLLACK, now building at the Electric Boat Co., Groton, Conn. The machinery for each vessel consists of four large engines and two auxiliary engines.

Eight of the large engines and four auxiliary engines were awarded to Fairbanks, Morse & Co., Chicago, for the sum of $1,805,380. These are for submarines Nos. 179 and 180, named PERCH and PICKEREL, now under construction at the navy yard, Portsmouth, N. H.

These eight large engines and four auxiliary units are of a type not previously built in this country. They are opposed piston diesel engines. This type of engine has two pistons, an upper and lower in each cylinder, each connected to its own crankshaft one above and one below. Advantages of this engine are: improved combustion efficiency, compactness and light weight for the power developed. Since submarine service places the greatest importance upon absolute reliability of operation, the acceptance by the navy of this type of engine is significant.

Bids for the machinery for the sixth submarine of the 1934 program No. 181, named POMPANO, now under construction at the navy yard, Mare Island, Calif., were opened on Nov. 27. Award was made on Dec. 1, to the Hooven, Owens, Rentschler Co., Hamilton, O., for the sum of $1,190,000. The electrical equipment will be supplied by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Bunker Prices

At New York

	Coal F. a. s. per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Dec. 19, 1934	5.63@5.38	1.20	4.65
Nov. 19	5.63@5.48	1.20	4.65
Oct. 19	5.63@5.48	1.20	4.65
Sept. 19	5.63@5.48	1.35	4.79
Aug. 18	5.63@5.48	1.35	4.79
July 19	5.63@5.48	1.35	4.79
June 19	5.63@5.48	1.35	4.79
May 18	5.63@5.48	1.35	4.79
April 19	5.63@5.48	1.35	4.79
Mar. 19	5.35@5.20	1.25	4.79
Feb. 19	5.35@5.20	1.25	4.79
Jan. 18, 1934	5.35@5.20	1.25	4.79

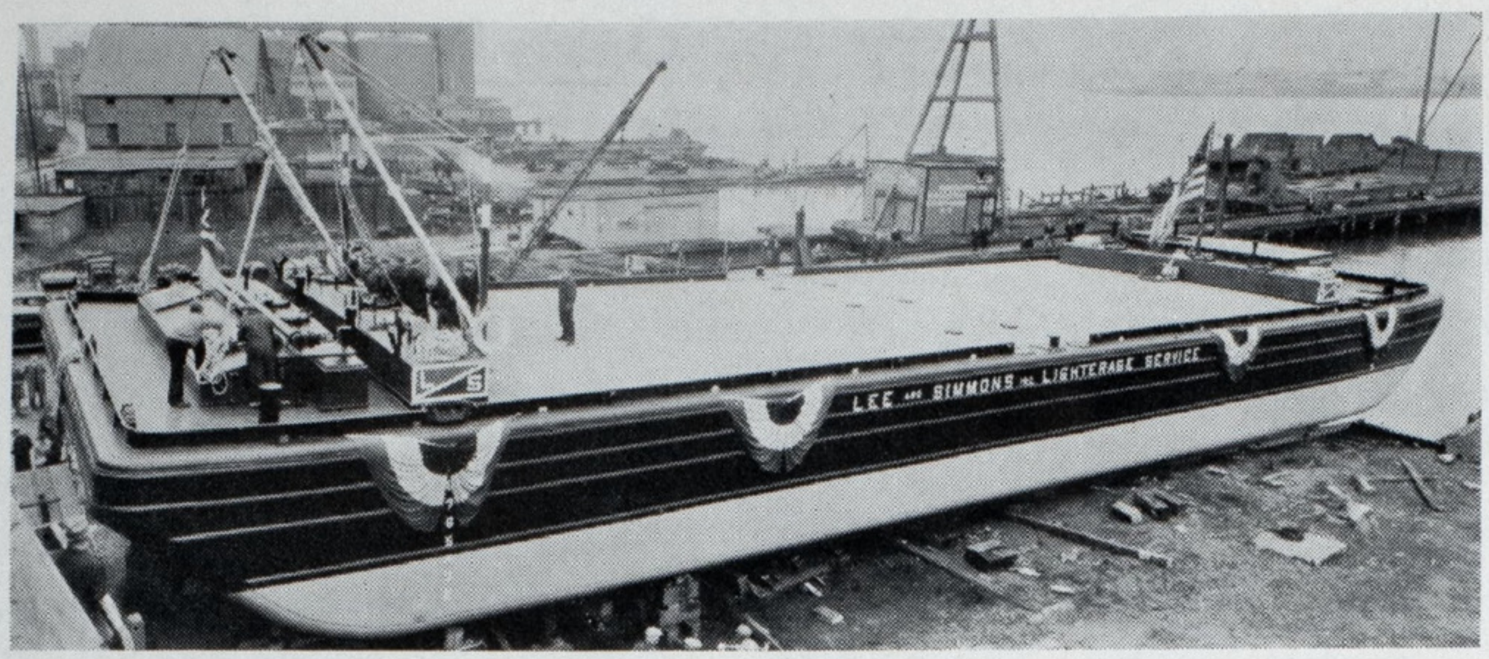
At Philadelphia

	Coal trim in bulk per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Dec. 19, 1934	4.93@4.68	1.20	4.61
Nov. 19	4.93@4.78	1.20	4.61
Oct. 19,	4.93@4.78	1.20	4.61
Sept. 19	4.93@4.78	1.35	4.76
Aug. 18	4.93@4.78	1.35	4.76
July 19	4.93@4.78	1.35	4.76
June 19	4.93@4.78	1.35	4.76
May 18	4.93@4.78	1.35	4.76
April 19	4.93@4.78	1.35	4.76
Mar. 19	4.65@4.50	1.25	4.76
Feb. 19	4.65@4.50	1.25	4.76
Jan. 18, 1934	4.65@4.50	1.25	4.76

Other Ports

Dec. 19, 1934

Boston, coal, per ton	$9.00
Boston, oil, f. a. s. per barrel	$1.17½
Hampton Roads, coal, per ton, f.o.b. piers	$4.75
Cardiff, coal, per ton	13s 6d
London, coal, per ton	—s —d
Antwerp, coal, per ton	15s 9d
Antwerp, Fuel oil, per ton	—s —d
Antwerp, Diesel oil, per ton	—s —d
British ports, Fuel oil	—s —d
British ports, Diesel oil	—s —d



Supercraft—All-welded tank barge of unusual design launched Nov. 28, 1934, by J. W. Evans & Son, at Tompkinsville, Staten Island, N. Y.

All-welded Tank Barge Keeps Even Cargo Temperature

By R. D. Mac Millen

INCORPORATING a new development in liquid-cargo carriers, all-welded, nonpropelled barge SUPERCRAFT, was launched Nov. 28, at the yard of J. W. Evans & Son, Tompkinsville, Staten Island, N. Y. for Lee & Simmons, Inc., general lighterage service, New York.

The new tow barge, designed by W. S. Macdonald, New York naval architect, is of combination tank and deck type, for carrying fluid cargoes below deck, and with extra heavy deck beams and deck suitable for deck loads. It is 130 feet long, with a beam of 38 feet and a depth of 11 feet. The hull is divided into ten watertight compartments. Cargo capacity is 1200 tons.

The space below deck from peak bulkhead to peak bulkhead is divided into three "U" shape tanks, each subdivided by a thwartship bulkhead, making a total of six separate tanks. Expansion trunks, located at extreme ends of tanks, fore and aft allow maximum clear deck space.

The bottom halves of the tanks, being arcs of circles, require no stiffening, while the upper vertical portions, extending to the deck, are stiffened by flat bars. The rounded bottoms, without stiffening members or other obstructions, assure free drainage. Large sumps located at the lowest point at each end of tanks are equipped with bell suctions.

Access to the bilges is provided through a two-foot space between the outer side of the tanks and the shell of the vessel.

A double system of heating coils, is installed in each tank, with individual controls at the steam manifold in the engine room. Accurate temperature control is maintained by the use of a Bristol indicating resistance thermometer.

Individual suction lines make it possible to carry assorted cargoes in the tanks and main pump connections to the double bottom permit the use of the outer compartments also, if desired. All suction lines are controlled through the manifold in the pump room.

Dual pumping equipment is installed in two gastight compartments in the forepeak. The pump room contains a Worthington steam driven horizontal duplex pump and a Worthington rotary pump of latest design, the latter driven by a 6-cylinder 82 horsepower Buda engine in the adjoining engine room.

The vessel, built to the highest standards of the American Bureau of Shipping for harbor, canal and limited coastwise service, has a superstructure designed for Barge canal clearance and provides commodious quarters aft for the crew. It is thoroughly ventilated throughout, electrically lighted, and equipped with all modern safety devices.

Designed primarily for the oil carrying trade, particularly vegetable oils, the "thermos bottle effect" is expected to prove of great value. The designers estimate that the contents of the tanks will retain at least 25 per cent of their original heat for a period of 72 hours or more.

The Battle Cruiser

(*Continued from Page* 10)

man battle fleet in the fast failing daylight.

Here then was a new function for battle cruisers to perform. They were expected to stand off the attacks of enemy battleships while battleships of their own fleet escaped. Von Hipper's ships stood up gallantly to this task, although it almost finished them after all they had been through. Darkness came as a welcome respite to the hard pressed German battle cruisers and enabled four out of the original five to escape.

Characteristics af Battle Cruisers

The stirring events of the battle of Jutland demonstrated many duties of battle cruisers in fleet actions, and indicated the characteristics necessary for the performance of these duties. Clearly in fleet actions one may expect battle cruisers to participate in protracted engagements with ships of similar type and also with battleships. The protective system of the battle cruiser should be comparable in efficiency, therefore, to that of the battleship. Moreover, there is little room for compromise in respect to the armament of the battle cruiser. A primary battery equal in caliber to that of the battleship is required and the number of primary battery guns should be little if any less than for the battleship. In respect to secondary and antiaircraft batteries and in respect to underwater protection, requirements of the two types are the same.

The remaining major characteristics, speed and cruising radius, are not easy to evaluate. In the battle of Jutland the superior speed of the British battle cruisers was of little or no importance, certainly of far less value than a more efficient system of protection would have been. It is conceivable, however, that in future fleet actions superior speed may prove to be of considerable importance. Moreover, high speed may be required by battle cruisers for the successful execution of functions other than those of fleet actions (battle of Falkland Islands).

On the whole it appears that high speed in a battle cruiser is most desirable, but that it should not be obtained at the expense of offensive or defensive power. One should keep in mind that an extra knot costs more in added displacement the higher the speed. Beyond 30 knots the cost is well nigh prohibitive. In the judgment of the writer, one should be satisfied with a speed of 20 per cent in excess of the standard for battleships, or, in other words, with some 27 to 28 knots.

A suitable cruising radius for a battle cruiser must be based upon the geographical position of the country and its possessions and upon the availability and location of fueling stations under its control. For the United States a long cruising radius is required by battle cruisers as well as by other naval ships.

It is apparent that the battle

(*Continued on Page* 40)

PURSE SEINER,

Advantages of Steel Construction

By ROBERT C. HILL

THE first steel, electric welded small craft built on the Pacific coast, the 70-foot purse seiner C. S. F. may mark an epochal transition from wood to steel in the construction of fishing vessels in this area. The C. S. F. as this is written is in Alaskan waters and is engaged in herring fishing for her owner the Chatham Straits Fish Co., Seattle. She was designed and built by Andrew B. Berg, president of the Berg Shipbuilding Co., Seattle.

Considering the general use of wood for the large fleets of fishing craft operating from the equator to Bering sea, should steel construction prove advantageous, it will mean not only an extended market for steel products, but also a considerable demand for tools and machinery necessary for steel shipbuilding.

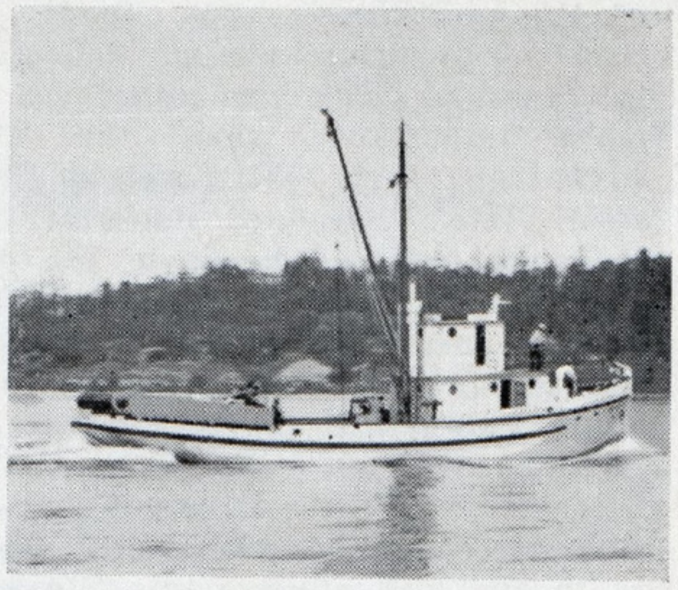
Versatility in Service

While the C. S. F. was designed primarily for purse seining she is adapted for other uses. The vessel has ample power for heavy towing, excess tank space for carrying and distributing fuel oil, as well as passenger accommodations for the use of officials and employes. In addition she can be used as a cannery tender.

The designer is a practical shipbuilder, who has operated a wood shipyard for eleven years and is thoroughly familiar with the intricate details of that business.

The adaptation of steel for the fishing industry is significant because of the abundance of lumber and its low cost in the North Pacific. However, the change has been forced upon shipowners, it is claimed, by the ravages of dry rot. This menace in recent years has reduced the life of the average wood fishing hull to five years. This is not an indictment against wood, Douglas fir in particular, generally used for building small hulls. There are wood ships on this coast still in service after 50 years of operation. They were built of seasoned materials, properly prepared and protected. But shipbuilders assert that the fishing industry itself is to blame. In the last 15 years owners have developed a "fever" for fast work.

In the circumstances loggers have not had opportunity, as in former years, to select trees suitable for ship timbers nor has the builder had a chance to season his material or to protect it against the elements. The result is that heavy investments in fishing craft have been dissipated. The problem has been growing more serious the last three years. Builders, alive to the situation, have been quietly developing steel hull designs.

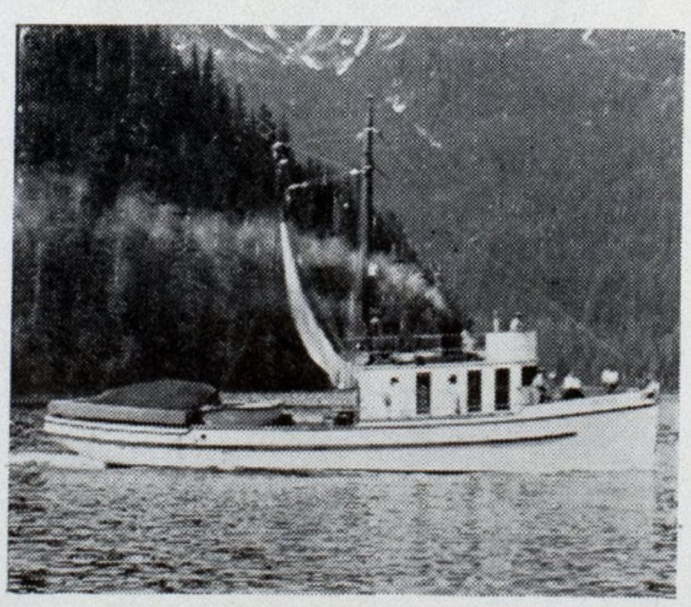


STEEL—Purse seiner C. S. F.. First steel hull, electric welded vessel of her type of Pacific coast

Large Fleet of Vessels

Accurate figures are lacking but it is known there are at least 250 seiners in service in Washington and Oregon. The North Pacific halibut fleet numbers 275 under the American flag and 75 of Canadian registry. It is estimated that in this area there are 3000 American and 3000 Canadian trolling vessels. All of this fleet is wood.

In the C. S. F. 60 tons of 62,000 pounds tensile strength steelplate was used. In a similar vessel of wood, about 40,000 feet of lumber is required. The C. S. F. is entirely of steel, including the house. Dimensions are: Length, 70 feet; beam, 19 feet; and depth 9½ feet. She is built along the same general lines as wood vessels of similar type. Power is furnished by a 135 horsepower Atlas Imperial diesel engine, driving her at 9.7 knots. The builder already has contracts for a sister vessel as well as for a 50-foot steel troller.



WOOD—Purse seiner AMERICAN EAGLE. *Of customary wood hull construction. Of similar type to the C. S. F.*

Work began March 1 and on June 10 the C. S. F. left Seattle for Crab Bay, Alaska, a voyage of more than 1600 miles. She carried 119 tons of cargo and fuel, made two calls en route, and arrived at destination in eight days. For 48 hours she encountered a strong westerly gale in the stormy Gulf of Alaska but reports state that she handled satisfactorily and developed no leaks, either in hull or tanks.

The cost of this first steel seiner was about 20 per cent higher than wood. However, with improved methods based on experience the builder figures that he will eventually be able to equal the price of wood construction. Also that it will be possible eventually to make delivery in sixty days or less.

While angles were used in building this first vessel, T bars are specified for the second. The latter type of construction is declared to afford greater flexibility for contraction and expansion. The Isaacson Iron Works, Seattle, furnished the steel.

Less Weight, More Space

Lesser weight and increased space are two advantages claimed for the steel hull. With wood, much of the interior is filled with heavy timbers, necessitating cramped living quarters and limiting cargo room. The resale value of wood hulls is greatly depreciated after one or more seasons due to the need of repairs. This will be obviated with steel, as the life of a steel hull, with reasonable care, should be 25 to 30 years.

The C. S. F. carries 7000 gallons of fuel oil in double bottoms. In the hold there is space for 900 to 1000 barrels of herring. Wood vessels of similar size have capacity for a maximum of 2000 gallons of fuel, carried in tanks installed in odd spaces wherever available.

In the accompanying illustrations are shown the C. S. F. and the AMERICAN EAGLE, a wood seiner, of similar type, from the same builders. However, the wood vessel is 75 feet long with beam of 18 feet, with the same machinery and speed as the C. S. F. But the steel hull is a larg-

(*Continued on Page* 38)

Equipment Used Afloat and Ashore

Radio Telephone—Deaerating Heater—Insulation—Gasket —Radio Compass—Adjustable Piston—Hold Ventilator

IN USING the radio telephone it is now possible by means of a new transmitter for a radioman on a coastal or ocean-going vessel to select any one of ten frequencies by merely giving a telephone dial one twirl and waiting an instant for it to snap back. The frequency shifting device resembles a miniature telephone board serving ten dial telephones.

The transmitter represents the latest developments made by Bell Telephone laboratories in Western Electric aviation and ship-to-shore radio equipment. Automatic control is so complete that the user's voice may be made to put the transmitter on or off the air instantly or to shut it down completely after an interval of from one to 15 minutes.

Any ten frequencies in the high frequency range of from 2 to 18 megacycles are available. A quick shift of frequencies is important in ship-to-shore radio telephone service where transmission conditions require the use of different frequencies for satisfactory communication depending on time of day and the distance to be covered.

New Deaerating Heater

A SPECIAL type deaerating heater for use in marine service has been developed by the Elliott Co., Jeannette, Pa. This deaerating heater gives the same ideal performance on shipboard as is obtained in heating feedwater by direct contact in conventional stationary types. By removing dissolved gasses from the feedwater, corrosion in boilers, feedlines and steam lines, is prevented. The feedwater is heated exactly up to the saturated steam temperature.

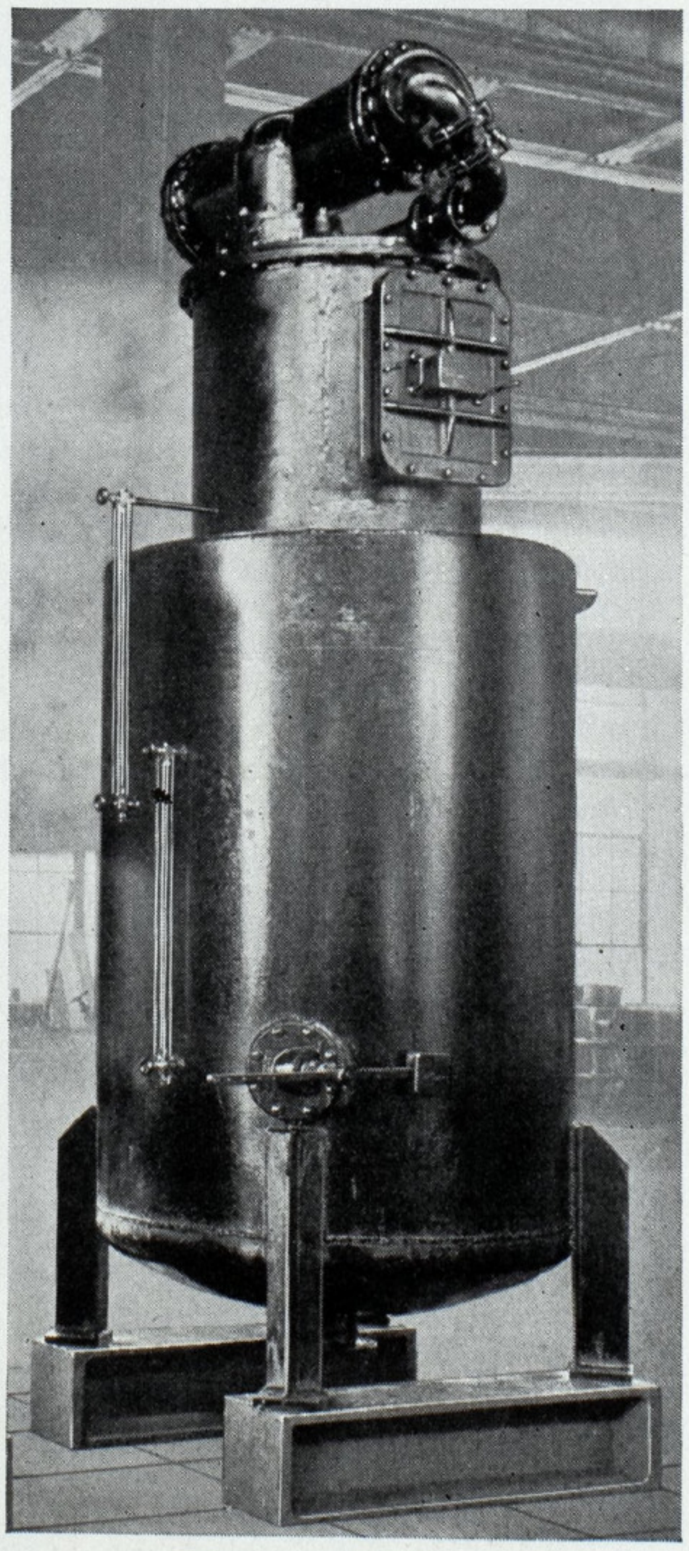
This new marine type deaerating heater shown in the accompanying illustration is being installed, on two large oil tankers. It has a capacity of 54,000 pounds per hour and is designed for smooth, continuous, unvarying performance on shipboard where it is subject to the roll and pitch of the ship. The deaerating element is of special design and is particularly efficient.

Flexibility of design is employed so that the heaters can be fitted into the space available on shipboard. Because of ample headroom in the case of the oil tankers, the heaters furnished were built along conventional lines with vent condenser on top and storage tank vertical.

The deaerating heater heads are of the non-storage type, made of cast iron to give maximum resistance to corrosion. This was considered of more importance than the disadvantage of the extra weight over steel plate. Standard material for the shell and end heads of the deaerating heater is copper bearing steel or Armco ingot iron, as preferred, for the primary reason of minimum weight. If the importance of greater corrosion resistance is sufficient to offset the disadvantage of added weight, cast iron can be used as in the unit illustrated. Storage tanks are always of copper bearing steel or Armco ingot iron; vent condensers of steel plate or cast iron.

Water storage tanks of ample capacity for each application may be of the vertical or horizontal type, to meet the specific limitations of space available. Support arrangements are welded to the storage tank for any desired type of mounting.

The design and construction of the equipment meets all requirements of the latest A. S. M. E. code for class 2, unfired welded pressure vessels, as well as the requirements of the American Bureau of Shipping and United States Steamboat inspection.



New Type Deaerating Heater Installed on Two Cargo Oil Tankers

Waterproofed Insulation

REFRIGERATION is a universal need on shipboard in lesser or greater degree. A new low density insulating material sealed against moisture recently introduced by the Insulite Co., Minneapolis, Minn., should therefore find useful application in the marine field. It is designed specifically for use in connection with cold storage spaces.

The new material differs from the company's standard insulation only in the special treatment it receives after fabrication. This treatment, it is said, forms a complete seal or envelope, which is an integral part of the insulation and which acts as a water-proofing medium while providing a tough, durable surface and a foundation for the final asphalt coating applied on the job.

It is furnished in all standard cold storage thicknesses and in sizes economical in application. The company recently prepared a comprehensive booklet describing the new product and its regular line of cold storage insulation.

Plastic Gasket Seal

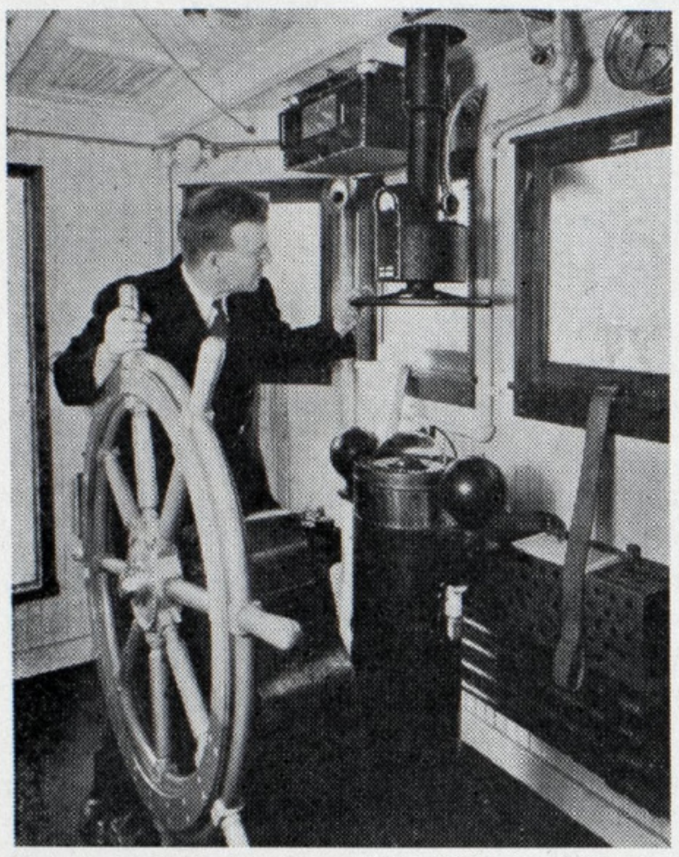
A NEW plastic gasket seal has been developed by the Bond Electric Corp., Jersey City, N. J. This new product, it is said, produces permanently leakproof joints which withstand vibration, high temperatures, high compression, water, gasoline, and oil.

The material sticks tightly to metal and all gasket materials, yet retains enough plasticity to permit ready removal of head gaskets. In using, a thin coating is applied on the surfaces that have been cleaned with gasoline and scraped until smooth. Bolts and screws are then tightened. keeping an even pressure. For head gaskets and other extra heavy duty joints, the material should be allowed to dry a few minutes before tightening the bolts or screws.

Improved Radio Compass for Marine Service

AN IMPROVED type of radio compass in now available for use in conjunction with the Western Electric marine radio telephone. The radio compass indicates the bearing of the distant radio station in relation to the direction in which the vessel is headed. The most common application is the determination of the ship's position by obtaining cross bearings of two or more radio stations whose locations are known. In addition, the radio compass may be used as a "homing" device. There are many other uses. Even the direction of radio static can be determined and may often be of help in indicating the location of storm centers and their paths.

Bearings to within 1 degree accuracy can be obtained even at distances of 200 miles and more from the radio station under favorable circumstances.



Improved Type of Marine Radio Compass on the Trawler Thomas Whalen

One feature of the compass is simplified procedure. A visual indicator is employed which enables the navigator to determine very accurately the correct "lubber-line" bearing. This method gives much more definite results than the older one which requires that the navigator listen on head phones for a minimum signal.

Another feature is freedom from the possiblity of obtaining bearings which are in error by 180 degrees. The "sense" of any bearing is indicated positively and directly during the simple procedure of turning the loop wheel in the natural direction to bring the needle to mid-scale of the indicating meter.

The compass consists of a radio receiver and a loop assembly. The loop, housed in a weatherproof casting, is normally installed on top of the pilot house. The loop is turned by means of a shaft extending down into the pilot house to the end of which a small hand-wheel is attached.

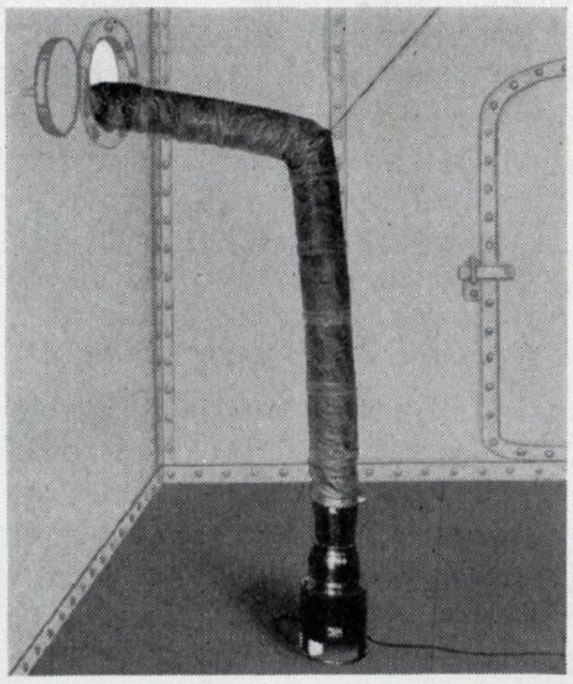
Operation is simplified to the following two adjustments: 1. Tune in the desired beacon signal by operating the tuning control on the receiver. 2. Rotate the loop hand-wheel in the direction which causes the indicator needle to follow in the same direction as the hand-wheel until the needle reaches mid-scale (center-line) of the meter.

Ship Hold Ventilator

FOR use especially in ship building and dry dock work a new ventilating unit has been developed by the Coppus Engineering Corp., Worcester, Mass.

It is designed to give a large volume of air, and still the complete unit can be lowered through a 14 inch diameter opening. As the total weight, including electric motor, is only 80 pounds it is readily portable and can be quickly set up and put into operation by one man.

The unique feature of this ship hold ventilator is, that it can be placed in a vertical position, resting on a ring of the ventilator inlet, so that the air can be removed from the very bottom of ship holds and other closed compartments.



Portable Ventilator for Shipboard

Flexible tubing of 8-inch diameter may be used to carry off a volume of 1500 cubic feet per minute of fumes and foul air.

This ventilator can also be used in a horizontal position, shown below.

Adjustable Plug Piston Of New Design

THE NEW Bodenlos adjustable plug piston, recently developed and introduced by the American Ship Building Co., Cleveland, is probably one of the most outstanding improvements for reciprocating engines in many years. The plug piston is generally recognized as the safest from the point of view of injury to the cylinder. Also, friction, which means power, is at a minimum with this type and frequent boring of cylinders and repairs to piston and rings are avoided. There are instances where, in high pressure cylinders, plug pistons have run for 20 years and are still good. They have, however, had one serious fault and that is the leakage and consequent fuel loss. No matter how nice a fit is made to the bore of the cylinder, when the tool marks are worn off in a few trips there is a slight leak which in time becomes greater.

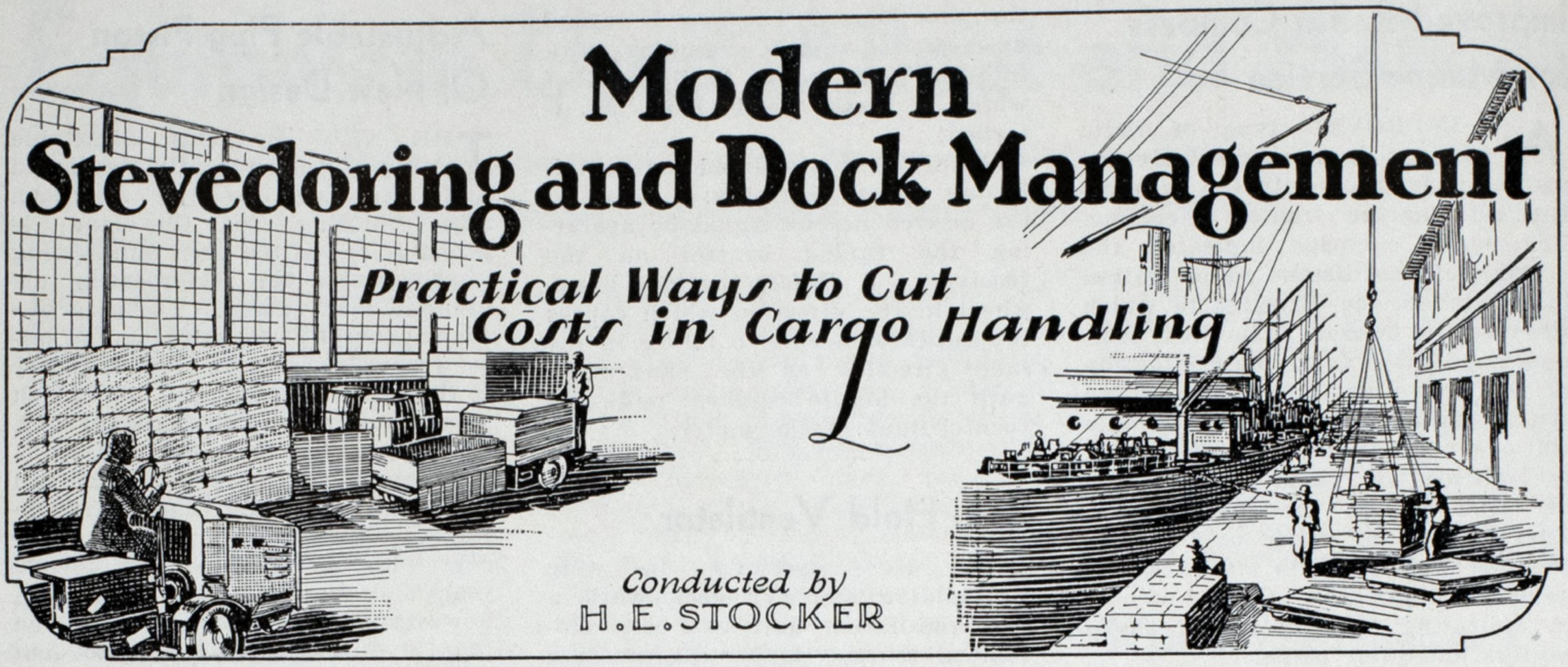
With this new plug piston which can be adjusted to the minimum clearance at any time, very conveniently and in a few minutes, without removal from the cylinder, leakage is avoided without losing the other advantages enumerated for this type of piston. Time and expense is involved in removing and old type piston from the engine. There are many times when they should be removed because they are worn down so much that they are inefficient but because of the expense nothing is done.

In using the new piston the operating engineer can keep the adjustment perfect at all times. Where this type has been fitted improved results have been noticed at once in tightness and increased revolutions of the engine.

The movement of the ring for expansion and contraction is by means of a right and left hand spiral thread and can be adjusted to a fraction of one-thousandth of an inch. It is, therefore, a true diameter at any point which has not been the case in other methods of expansion rings.

The West Kentucky Coal Co., Paducah, Ky., it is reported, has awarded a contract to the Marietta Mfg. Co., Point Pleasant, W. Va., for the construction of 10 standard steel river barges for coal carrying, each barge is to be 175 x 26 x 11 feet.

Ship Hold Ventilator of Portable Type with Flexible Tubing



Fast Schedule Maintained by Modern Ships Efficient Cargo Handling Facilities

By Gerard E. McNamara

A BRIEF survey of the trade in which vessels of the Colombian Steamship line operate clearly indicates the exacting schedule which the company has undertaken to maintain. Plying between New York and Colombia, South America, the southbound ships of the line stop at Port au Prince, Haiti; Kingston, Jamaica; Puerto Colombia and Cartagena, Colombia: and Cristobal, Panama Canal Zone. On the homeward trip the ships again put in at Kingston and at Port au Prince. At all of these ports the vessels are berthed at public wharves, which necessitates their rapid discharge and loading.

Weekly sailings from New York are made possible by the superior speed of the new liners COLOMBIA and HAITI and the United Fruit liner PASTORES, operated under charter by the Colombian line. Proper organization and management of cargo handling operations permit the ships to maintain a schedule of 18 days per voyage and 3½ days in terminal at New York. Under such a schedule the ships are performing their primary function of transportation a good proportion of the time actually in service.

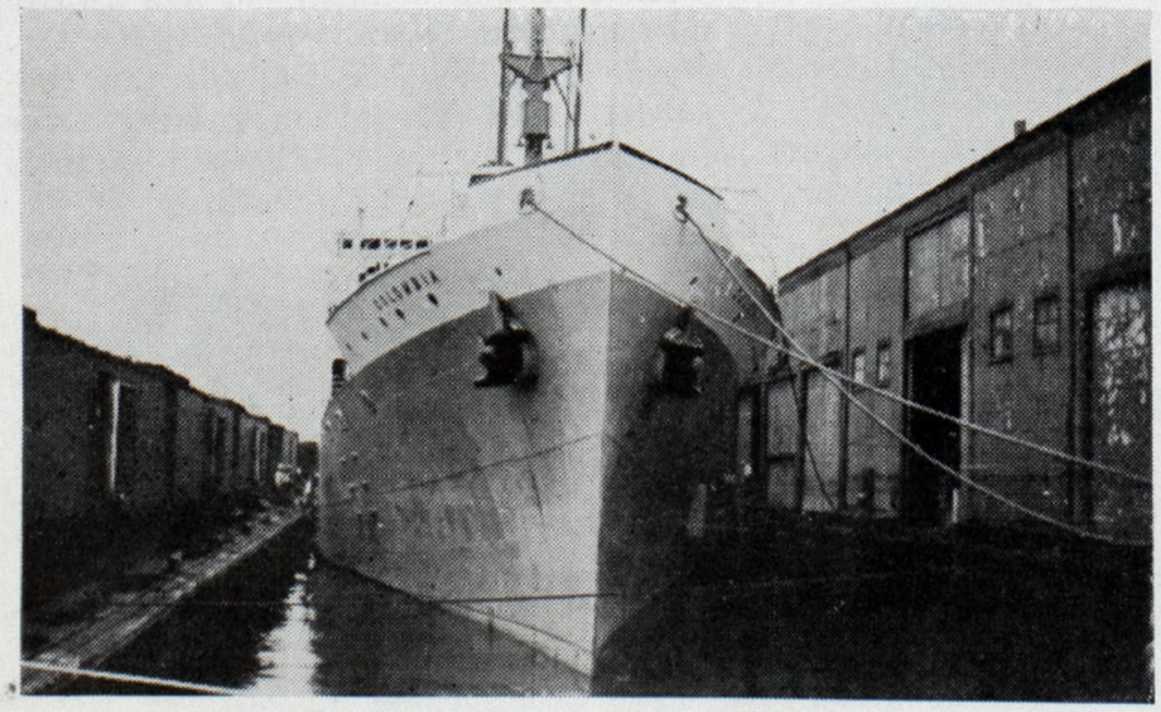
Quick Discharge of Cargo

Ordinarily the vessels berth at Pier 9, New York docks, Brooklyn, early Monday morning each week. For the past several months, however, they have been docking at Pier 8, East River, New York, where they discharge an average cargo of some 30,000 stems of bananas per voyage. Thanks to speedy handling of cargo the ships are enabled to leave Pier 8 early the same evening and move upstream to Pier 20, East river, New York. Here conveyors make the task of discharging about 10,000 additional stems another speedy operation. In the banana loading and discharging operations the value of the six sideport hatches in each side, is particularly well demonstrated. After finishing discharge of bananas the ships move over to their own pier on the Brooklyn side of the river to complete unloading. An average cargo consists of approximately 8000 bags of coffee, 5000 bags of coconuts, a quantity of ivory nuts, dry hides, goat skins and many other miscellaneous items.

The successful maintenance of so difficult a schedule, week after week, without serious delay, is a fine tribute, not only to the excellence of the ships from the standpoint of efficient cargo handling facilities, but also to the organization and management of terminal operations.

New Ships Are Efficient

Steamship officials and operators agree that the COLOMBIA, and her sistership the HAITI, designed by Theodore E. Ferris, are fine examples of his skill in turning out carefully planned ships of maximum efficiency in cargo handling operations. In the construction of these vessels, the architect was faced with the necessity of obtaining great earning capacity, coupled with the ability to carry a variety of perishable cargo.



S. S. Colombia of the Colombian Steamship Line, unloading bananas at New York. Both sides of ship worked through sideport hatches

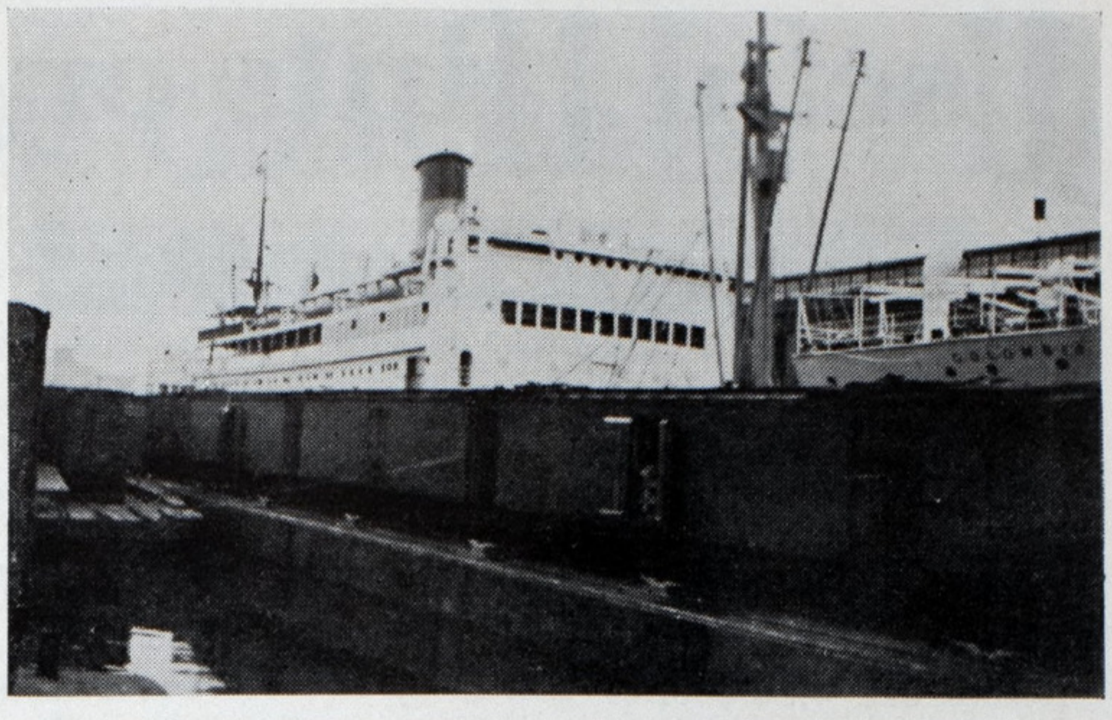
In such combination cargo and passenger vessels, this called for the greatest cubic capacity possible, and equipment for efficient loading and discharging. The latter requirement was fully met by the installation of sideports in addition to overall hatches.

The sisterships are built with three cargo decks, viz., the holds, the lower 'tween decks and the main 'tween decks. The Nos. 1 & 5 lower 'tween decks and the Nos. 2 and 5 main 'tween decks are equipped for the carriage of refrigerated (air-cooled) cargo. Nos. 1 & 6 lower 'tween decks and Nos. 1, 3, 4, & 6 main 'tween decks are mechanically ventilated. The hold compartments, used principally for the carriage of such cargo as coffee, coconuts, general, etc., are neither refrigerated nor mechanically ventilated.

The steel decks of the lower holds are laid over with wood, which offers a smooth and clean surface which is especially desirable for the carriage of coffee, sugar, and other bagged cargoes. This also eliminates the use of dunnage. In both the lower and main 'tween decks wooden gratings cover the steel decks. These gratings allow a current of air to pass in and around the cargoes of bananas which are usually stowed in these spaces.

Arrangement of Sideports

The six sideport hatches on both port and starboard sides of the vessels give access to Nos. 1, 3, 4 & 6 mechanically ventilated cargo compartments, and to Nos. 2 & 5 refrigerated compartments, all on the main 'tween decks. The port openings measure 8 feet x 7 feet 6 inches and have double doors, in two pieces, split vertically on the centerline, arranged to swing outboard, one forward and one aft. Ports Nos. 3 & 4 give access to cargo cranes located in Nos. 1 & 3 mechanically ventilated compartments on the main 'tween decks.



Carfloats alongside the S. S. Colombia at New York. Unloading bananas direct to railroad cars through side ports

Two additional ports, for stores, measuring 6 feet x 4 feet are provided in the main 'tween decks and upper deck amidships. These ports are of the single door type, split horizonally on the centerline, both sections opening outboard and aft. This arrangement permits the upper half being opened during good weather, thus providing fresh air and light to the sections in way of the ports.

On the upper weather deck are located the four overall hatchways, the measurements of which follow:

No. 1 — 18′ 0″ x 14′ 0″
No. 2 — 24′ 9″ x 18′ 0″
No. 5 — 20′ 3″ x 18′ 0″
No. 6 — 18′ 0″ x 14′ 0″

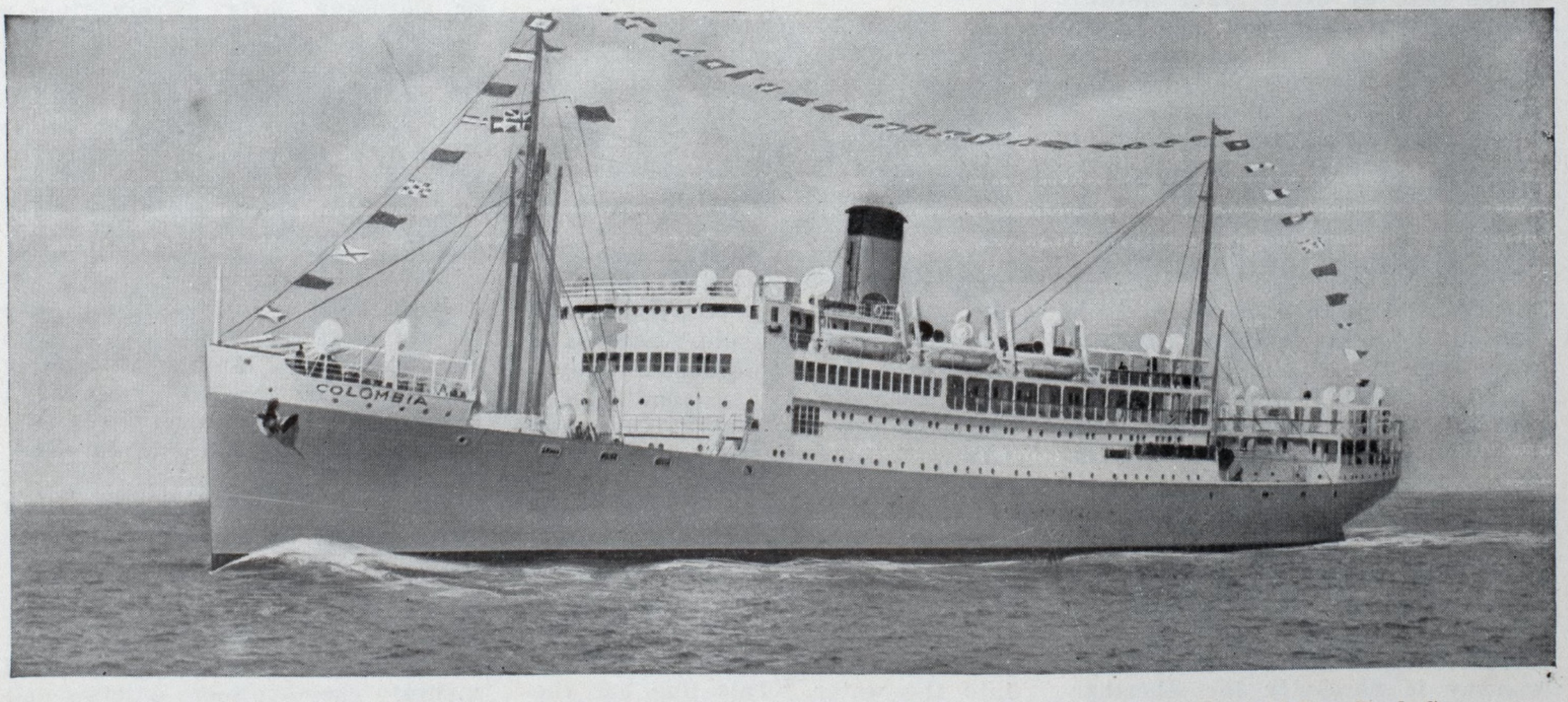
Two blind hatches serve the lower 'tween decks and holds by way of Nos. 3 & 4 sideport hatches. Hatch No. 4, 9 feet x 8 feet, gives access to the general cargo compartment, No. 3, in the lower 'tween decks and No. 3 hold. Hatchway No. 5 serves the No. 4 lower 'tween decks and hold through two openings, each 9 feet x 8 feet. The two openings are necessary for stowing cargo in the No. 4 hold which is divided into port and starboard sections by the shaft tunnel through its center. Both blind hatches are located on the main 'tween decks.

There are nine steel tubular cargo booms serving the weather deck hatches. Two 5-ton booms, each 46 feet long, are at No. 1, and two booms of the same capacity and length take care of No. 2. At No. 2 hatch there is a heavy lift boom rated at 25-tons, which is 55 feet long. Nos. 5 & 6 are equipped with two 5-ton, 46-foot booms each. No. 4 blind hatch is served by one cargo arm crane, while No. 5 is equipped with two such cranes. The blocks on all booms are fitted with roller bearings.

Steel Hatch Covers

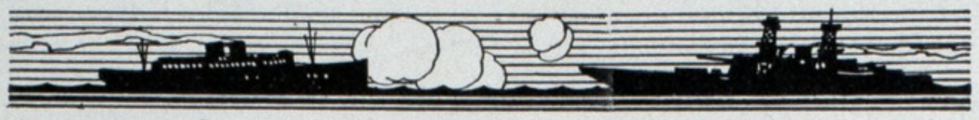
The hatch cover of No. 1 hatch on the weather deck is of steel construction, built in one piece and hinged up forward. The height of the coaming at this hatch, as at all weather deck hatches, is about two feet. The single section hatch cover is fitted with a small trap hatch about 24 x 24 inches. No. 2 hatch cover is also

(*Continued on Page* 36)



S. S. Colombia, designed by Theodore E. Ferris, built in 1932 *by the Newport News Shipbuilding & Dry Dock Co.*

Useful Hints on Cargo Handling



INCLUDED among the more efficient, from a cargo handling standpoint, of the freighters entering New York harbor are those equipped with three cargo masts. In the ordinary type of freight ships having five over all hatchways, the amidship hatches, Nos. 3 and 4, are often served by four or more kingposts each carrying one cargo boom. Many of the foreign ships, however, are fitted with three cargo masts, the forward one seating two booms for the No. 1 hatch, a like number for No. 2 hatch, and a heavy-lift boom for the latter. On the amidships cargo mast are fitted two booms for the No. 3 hatch and two for No. 4. An additional extra long boom is carried on this mast to serve No. 4 hatch. On the after mast two booms serve No. 5 hatch.

This arrangement makes it possible to conserve the deck space usually taken up by the winches necessary to work the booms on the kingposts. This is a very valuable feature, especially when deck cargo is carried amidships. There is also a reduction in initial costs effected by the grouping of the cargo booms about the cargo masts instead of seating them on kingposts at each corner of the hatch.

This method of rigging the cargo masts is quite prevalent on the vessels of the more progressive of the foreign freight lines.

Grain can be unloaded faster with ships gear using large square canvas slings than by using grain elevator available. The conveyor may handle 80 tons an hour and the ships gear only 40 tons per gang, but four ships gangs will discharge 160 tons an hour, greatly expediting dispatch of the ship.

Good Ramps and Inclines

IF RAMPS or inclines are made of wood, the joints should be carefully made and the planks thoroughly secured against uneven deflection, says the recently revised safe practices pamphlet No. 59 of the National Safety council.

If cleats are provided to prevent persons from slipping the cleats should be placed about 14 inches apart and should extend from guard rail to guard rail at right angles to the line of travel: except where a runway is necessary for wheelbarrows and trucks, in which case the two outer planks of the runway should be equipped with cleats. In some cases covered ramps or inclines are surfaced with rubber carpet or a leather mat covering. Splinters, nails, patches, irregularities, breaks or cracks in walking surfaces are dangerous and should not be tolerated.

THIS page is being devoted to short items on all matters having to do with the more efficient turnaround of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.

Casks of olives weighing 1600 pounds are handled economically by a crane truck on a New York terminal.

A crane truck was used on a New York pier to handle seven-ton mahogany logs from the dock deck onto a motor truck. The job was performed economically and quickly.

Safe Jacob's Ladders

A RADICAL change, which tends toward promoting the safety of those using ships Jacob's ladders, has been made in the construction of these age old appliances. The modern type of safety ladder is used on some steamers but it should perhaps be used on all. The ladder is built up in two sections of equal length, the lower one being fitted to the upper one by means of a "U" bolt. The outer sides of the ladder are made up of oval pieces of wood into which have been fitted two small crosspieces to form each rung. The outer edges of the oval shaped pieces of wood are covered with rope, spliced at the top and bottom of each piece.

The rungs are made up of small crosspieces fitted into the sides in such a manner as to leave a small space between them. Through this space a line extends from the deck into the water. This line has the effect of steadying the rungs as pressure is applied to each during the ascent or descent. A little more than halfway down the first section of the ladder, a length of 2 x 4 inches lumber is lashed crosswise to the ladder so that the edges of the ladder divide the lumber into equal parts. One quarter of the way down the second section another length of lumber is placed in a similar position. This lumber has the effect of minimizing the swaying of the ladder while the ship is pitching or in a heavy wind.

Pilots, among other users of Jacob's ladders, would appreciate such measures taken to promote their safety while boarding or leaving a vessel.

Steel and Manila Lines

MOORING line of a new type recently developed embodies the features of steel lines with none of the disadvantages of steel cable. This line, made up of plow steel and manila rope braided together, permits the use of a line having a smaller diameter than would be necessary were the line made up of manila only. Due to the presence of the manila rope, this mooring line will not kink in the manner usual with this type of cable. It outlasts, both all-cable and all-manila lines of similar dimensions.

Its strength is attested to by the story of the American ship which experienced quite a bit of difficulty with the towboats in one of the larger European ports. Every time a line was passed to the towboat it was broken, due to the incompetence of the towboat captain. On a recent voyage the ship passed over a line made up of the steel and manila. The towboat captain tried his usual tactics. Result—he almost turned the towboat turtle!

Palm oil shipped in bulk to a soap factory must be loaded only into absolutely clean tanks. A quart of lubricating oil remaining in a tank from a previous shipment will contaminate 700 tons of palm oil. Correct pumping temperature is 135 degrees. Coils for heating the oil must extend to the bottom of the tank.

Roller bearing blocks should be used throughout the cargo gear of a ship. They are more efficient and safer.

Up and Down the Great Lakes

Bulk Freight Declines — Lake Levels — Ore Shipments Less — American & Canadian Grain—Coal Movement—Winter Moorings

TOTAL traffic through the Sault Ste. Marie Canals, Canadian and United States locks, for the month of November, was 2,626,937 tons which is a considerable falling off from the total traffic of 3,021,831 tons during November, 1933. Grain shipments were 383,944 bushels or 11,518 tons heavier than in November last year, but iron ore decreased by 211,210 tons or from 797,243 tons to 586,133 tons; soft coal decreased by 214,535 tons or from 886,891 tons to 672,346 tons.

A new high record, however, was set for November in the total traffic using the Welland ship canal which amounted to 1,253,412 tons, exceeding last year's total for November by 183,621 tons. A new high record was also set for the season up to the end of November, the total traffic exceeding that for the corresponding period of last year by 75,593 tons. Wheat shipments in November were heavier than in 1933 by 56,890 tons, although for the season to the end of November, they were lighter than last year by 1,073,383 tons or 38 per cent. Barley was heavier by 27,078 tons, corn by 28,224 tons, gasoline by 12,983 tons, petroleum and other oils by 11,934 tons, bituminous coal by 25,550 tons and iron ore by 25,613 tons.

The total traffic through the St. Lawrence canals during November was 883,598 tons an increase of 108,164 tons over the total traffic for November, 1933, when the total was 774,634 tons. Wheat shipments through the St. Lawrence canals during November were 202,196 tons as compared with 218,681 tons in November, 1933; flour shipments were also lighter by 11,760 tons. Barley, corn, oats, and flaxseed all recorded increases. Iron and steel increased by 14,659 tons, gasoline by 25,757 tons, anthracite coal by 33,684 tons and sand by 45,150 tons.

Elect Donahue Manager

On Nov. 27, William F. Donahue was elected manager of the Great Lakes department of the American Bureau of Shipping, succeeding the late H. N. Herriman who died on Sept. 18. He was selected for this responsible post at a meeting, on that day, of the executive committee of the American Bureau of Shipping, presided over by J. Lewis Luckenbach, New York, president of the bureau. This meeting was held at the head office of the Great Lakes department at 660 Rockefeller building, Cleveland.

For a number of years Mr. Donahue had been chief surveyor of the Great Lakes department and was located at the Cleveland office.

November Lake Levels

The United States Lake survey reports the following monthly mean stages of the Great Lakes for the month of November, 1934, determined from daily readings of staff gages:

Superior	602.96
Michigan-Huron	577.58
St. Clair	572.63
Erie	569.62
Ontario	242.81

Lake Superior was 0.02 foot lower than in October and it was 0.17 foot above the November stage of a year ago .

Lakes Michigan-Huron were 0.12 foot lower than in October and they were 0.11 foot below the November stage of a year ago, 1.32 feet below the average stage of November of the last ten years.

Lake Erie was 0.25 foot lower than in October and it was 0.55 foot below the November stage of a year ago, 1.56 feet below the average stage of November of the last ten years.

Lake Ontario was 0.28 foot lower than in October and it was 0.63 foot below the November stage of a year ago, 2.11 feet below the average stage of November of the last ten years.

American Grain Decreases

Reflecting the effects of the drought in the Middle west the past summer, lake shipments of domestic grains declined sharply in 1934 compared with 1933 and 1932. Estimates show that the movement of principal grains from the Duluth-Superior, Chicago and Milwaukee ports totaled slightly over 80,000,000 bushels last year, against 128,023,000 bushels in 1933 and 115,933,000 bushels in 1932. This was a decrease of 37 per cent from 1933 and 31 per cent from 1932.

All ports shared in the lighter deliveries, Duluth showing a drop of about 38 per cent from the preceding year, Chicago 27 per cent and Milwaukee 72 per cent. Reduced shipments of the two principal grains accounted for the major share of the decrease in traffic. Chicago moved 11,749,000 bushels of wheat, against 6,959,000 bushels in 1933, but corn shipments dropped from 37,279,000 bushels to 23,947,000. Oats declined from 6,779,000 bushels to 1,849,000. Chicago's total was 37,864,000 bushels against 51,725,000 in 1933.

Milwaukee had a light movement of corn, 596,436 bushels against 7,778,742 bushels in 1933. Wheat shipments were off from 5,066,540 bushels to 2,547,456. The total movement from Milwaukee of 3,852,115 bushels compares with 14,062,999 in 1933.

Ore Shipments Decline

For the fourth consecutive month ore shipments from upper lake ports during November showed a decrease over shipments in 1933. During the past month of November 484,191 long tons of ore were shipped as compared with 784,815 tons during November, 1933, a decrease of 300,624 tons or 38.31 per cent.

Ore shipments for the season up to Dec. 1, 1934 amounted to 22,249,600 long tons as compared with 21,623,898 tons for the season of 1933 up to Dec. 1, or an increase of 2.89 per cent.

Shipments of ore by rail from Lake Erie ports to furnaces during the month of November amounted to 301,169 tons as compared with 465,200 tons during November, 1933. For the season of 1934 up to Dec. 1, the shipments of iron ore from Lake Erie ports to furnaces amounted to 11,098,768 tons as compared with 11,910,587 tons for the same period in 1933. On Dec. 1, 1934, the balance of ore on dock at Lake Erie ports was 5,248,555 tons as compared with 5,405,691 tons on Dec. 1, 1933.

The steamer HENRY CORT, while attempting to enter the harbor at Muskegon, Mich., on the night of Nov. 30 during a severe gale, struck the north breakwater. The crew were all rescued but the vessel was reported to be a total loss.

Coal Shipments Highest In Four Years

Not since 1930 have bituminous coal shipments via lake vessels from Lake Erie ports been as heavy as they were in 1934. For the season of 1934, up to 7 a. m., Dec. 17, the movement amounted to 34,800,744 net tons of cargo and 1,098,486 net tons of bunkers or a total of 35,899,-230 net tons. The corresponding figure for 1930 was 38,156,666; for 1929 it was 39,360,741; and in 1928 it was 34,697,991.

The movement for 1934 up to Dec. 17 shows an increase of 3,664,487 tons over the same period in 1933 and it is 10,807,907 tons more than the movement for the same period in 1932. It is also 4,513,299 tons more than the movement for the corresponding period of 1931.

During the same period of 1933 the cargo coal moved amounted to 31,255,689 tons and the bunker coal, 979,054 tons, making a total of 32,-234,743 net tons. In the like period of 1932 cargo, bunkers and total were respectively 24,482,871 tons, 608,452 tons, and 25,091,323 net tons. For the same period in 1931, cargo, bunkers and total were respectively 30,415,291 tons, 970,640 tons and 31,385,931 net tons.

Average shipments of bituminous coal for each of the four weeks ending 7 a. m., Dec. 17, totaled 366,110 net tons of cargo and 9387 net tons of bunker.

Anthracite coal shipments on the lakes for the season up to Dec. 1, amounted to 541,976 long tons. For the same period in 1933 the amount was 379,685 long tons, and in 1932 the amount was 262,433 long tons. The anthracite coal shipments were, therefore, over double what they were in 1932.

Engineers Propose Plan

Col. M. C. Tyler of the United States engineers, in charge of the Great Lakes district, recently presented specific recommendations to Washington, based on a study by the United States engineers over a 7-year period, for broad plan of development of navigation facilities on the Great Lakes, the St. Lawrence and the Barge canal to the Hudson.

The program calls for a total expenditure of some $336,462,000 for rivers and harbors improvement including $175,000,000 for the St. Lawrence waterway. Also included in the project is an expenditure of $27,000,000 for deepening to 14 feet, increasing bridge clearances to 20 feet and generally improving the Erie canal between Buffalo and Albany; and the necessary outlay to make the harbors of Buffalo, Cleveland, Toledo, Detroit, Calumet, Chicago, Milwaukee and Duluth suitable for accommodating ocean traffic.

This huge development would provide 100,000,000 man hours of work for a period of four to seven years, and Colonel Tyler said that the United States engineers are ready to proceed with the work under any plan of financing which may be authorized by congress.

That the question of going ahead with the St. Lawrence waterway, that is the approval of the treaty with Canada for its construction, will come up for action early in the session of the new congress is the general opinion. Opposition to this project continues strong, but it is believed that the President is determined to see it through to a successful issue.

Storage Grain Fleet Small

Only 66 vessels with storage grain were moored in Buffalo harbor early in December which is said to be the smallest fleet for grain storage in five seasons. In 1930 there were 110 vessels; 82 in 1931; 68 in 1932; and 70 in 1933.

In quantity also the storage grain in vessels is much smaller than usual, being only 20,000,000 bushels, which is only about one-half of the record in 1924 when 120 vessels stored over 37,000,000 bushels during the winter months.

Winter Mooring Rules

Instructions have been issued by Guy A. Myers, principal surveyor, Great Lakes district, United States Salvage Association Inc., for winter moorings.

These instructions set forth limitations and restrictions applicable to various ports where winter mooring is considered hazardous. If conditions arise which make it impracticable to adhere strictly to these requirements, the matter should be referred to Mr. Myers at the Rockefeller building, Cleveland.

Engineers Hold Hearing

In accordance with a resolution of the committee on rivers and harbors, house of representatives, adopted June 15, 1934, consideration is being given by the board of engineers for rivers and harbors whether it is advisable for the United States to purchase the canal now owned by the sanitary district of Chicago. A public hearing for the purpose of hearing arguments for and against this proposal was held by the United States district engineer Dec. 19 in the United States Post Office building, Chicago.

Canadian Grain Movement On Great Lakes

Shipments of grain from Fort William and Port Arthur, Ont., from Nov. 15 to Dec. 12, inclusive were as follows:

Wheat to Canadian lower lake ports, 5,111,357 bushels; to Montreal, 524,909 bushels; to other Canadian ports, 31,100 bushels; to Buffalo, 7,057,799 bushels; and to other United States ports, 4,638,497 bushels. This makes a total of 17,-363,662 bushels of wheat shipped via lake vessels.

In the same period oats moved from the same ports in the following quantities: to Canadian lower lake ports, 1,134,366 bushels; to Montreal, 27,000 bushels; to other Canadian ports, 191,966 bushels; to Buffalo, 81,852 bushels; and to other United States ports, 586,886 bushels. The movement of barley was as follows: to Canadian lower lake ports, 62,211 bushels; to Buffalo, 191,676 bushels; and to other United States ports, 2,040,352 bushels. The only flaxseed moved was 95,453 bushels to Canadian lower lake ports, and 60,000 bushels to Montreal. Only 20,000 bushels of rye moved to Canadian lower lake ports; and 60,000 bushels to United States ports other than Buffalo. A movement of barley malt took place, all of it, 2,845,390 pounds, going to Montreal. Screenings moved in the following quantities: 1399 tons to Canadian ports other than Montreal and lower lake ports; 4849 tons to Buffalo; and 8701 tons to other United States ports.

The grand total in all kinds of grain shipped via lake vessels from Fort William and Port Arthur, Ont., from Nov. 15 to Dec. 12, both inclusive, was 21,915,424 bushels; 14,-949 tons of screenings; and 2,845,-390 pounds of barley malt.

The total shipment of grain via lake vessels from these ports for the entire season of navigation, 1934, subject to revision, is as follows: Wheat, 153,931,618 bushels; oats, 13,503,438 bushels; barley, 13,332,-791 bushels; flaxseed, 328,799 bushels; rye, 689,283 bushels; barley malt, 10,445,690 pounds; mixed feed, 530 tons; and screenings, 47,625 tons. The grand total of all grains during the season 1934 from these ports via lake vessels is 181,785,929 bushels and 53,-378 tons in the combined movement of barley malt, mixed feed and screenings.

The forty-second annual ball of Detroit Lodge No. 7, International Shipmasters' association, will be held at the Hotel Statler, Detroit, Wednesday evening, Jan. 30. Capt. George W. Wilson is chairman of the executive committee.

Personal Sketches of Marine Men

L. W. Lake, President, Canal Carriers Association Inc.

By Ben K. Price

IN HIS election last year as president of the Canal Carriers Association Inc. he returns to an office he held several years ago.

HIS experience in transportation affairs covers operation not only on the New York State Barge canal but also on the lakes and railroads.

THE association has worked in close cooperation with the state for better facilities with the view of improving the service to shippers.

FOLLOWING his election in 1934 to the presidency of the Canal Carriers Association Inc., New York city, L. W. Lake assumes duties which he handled so ably several years ago. Prominent in his field, president of his own shipping company and a charter member of the association, he has been identified with transportation not only on the inland waterways of New York state, but on the Great Lakes and railroads; hence his long and varied experience has at all times proved most helpful to the organization. He was vice president of the association, when he recently succeeded W. S. Hedger to his present position.

Born in New Hempstead, Rockland county, New York, Mr. Lake first became associated with the transportation field at the age of 18, serving as a stenographer in the New York city offices of the Wisconsin Central. After a few months he became a contracting agent and subsequently joined in the same capacity the New York offices of the Great Northern Railway Co. Here he had his first contact with water transportation, as the company owned the Northern Steamship Co., which he was also called upon to serve.

After a year he was promoted to the position of general agent in the New York district, remaining for seven years. He then became general eastern agent for the Mutual Transit Co. After six years in this position he was transferred to the Buffalo offices of the company as general freight agent. There he remained for two years, and then was engaged in the same capacity for two years more with the Great Lakes Transportation Corp., Buffalo.

Mr. Lake then returned to New York as traffic manager of the federal government's canal line, and has been closely identified with canal transportation in New York state ever since. In 1924 he organized the Despatch Shipping Corp., 44 Whitehall street, New York city, to engage in canal transportation, and became president, a position he continues to hold.

In his years of close contact with the New York state canal system he has seen its transportation reach the highest peak in its history. Since the new canal was opened in 1918, he has seen freight traffic, in fact, more than tripled, going from the low point in that year of 1,159,270 tons to a peak of 4,074,002 tons in 1933. Due to depressed business conditions generally tonnage the past three years has increased less, in line with decline in freight movement generally, but proportionally tonnage has held up very well.

In the development of traffic on the New York state canal system the Canal Carrier's Association Inc., which he now heads, has played an important part. Organized eight years or so ago, this association, which includes in its membership all of the New York canal carriers, a total of 18, has worked steadily for improved facilities and in this has received fine cooperation from the state of New York. The carriers have found in Colonel F. S. Green, who was first appointed superintendent of public works of the state of New York by ex-governor Alfred E. Smith, and who has continued in this office ever since, a man with a particularly keen understanding of their problems; also in his commissioner of canals, R. S. Hayes, and in his division superintendents.

The formation of the Canal Carrier's Association came a few years after the state of New York had regained control of the waterways. The new canal was completed in the spring of 1918, and from 1919 to 1921 it was operated by the federal government under measures set up by the war emergency. Upon return of control to the state, shipping lines dealt directly with the state authorities, but it soon became evident that the most effective progress could be obtained through the formation of an organization of all the shippers, working in cooperation with the state. Following its formation by a few years, the association was incorporated in February, 1928.

It was in one of these formative years that Mr. Lake was president, and his recent reelection comes as a tribute to this and other fine services rendered the association.

Schedule Maintained

(*Continued from Page* 31)

of steel but is divided into two pieces, with the forward third hinged up and aft on the after two-thirds, which in turn is hinged up and aft. No. 5 is the same as No. 2 except that it hinges up and forward. No. 6 hatch cover is similar to No. 1, but hinges up and aft.

The steel hatch covers can be opened much more quickly than the old type of tarpaulin-covered wooden covers. The number of strongbacks is also greatly reduced, a factor which increases the speed of making ready for cargo handling. No. 1 hatch has but a single strongback on the upper deck. Insulated wooden covers are used on the main and lower decks, each requiring three strongbacks. No. 2 hatchway requires two strongbacks on the upper deck and five each on the main and lower decks. The after hatches are similar excepting that provision is made for the shaft tunnel in way of Nos. 5 & 6 hatches in the hold.

Since the Colombian liners carry passengers as well as freight they do not transport very much deck cargo. The weather decks are all of wood and are adequately equipped with ring bolts, stanchions, etc., for the lashing of such deck cargo as they might carry. On the upper deck forward there are placed four cargo hold ventilators, which are trunked through the 'tween decks, while six similar ventilators are to be found on the after deck. Two small manholes, with a 6-inch coaming, give access from the weather deck forward to ladders leading to the upper 'tween decks. In the 'tween decks other ladders lead below. On the after deck are four similar means of access. The manholes are equipped with steel covers, inside of which are fitted insulated wooden covers.

Description of Winches

Four winches are provided at each mast, the after two on the foremast being double-drum winches for use with the 25-ton heavy-lift boom. All others are single-drum double-reduction electric winches, capable of lifting 4000 pounds at 174 feet per minute. One of the drums of the double-drum winches has the same capacity for use with the 5-ton booms and is equipped with a clutch which throws this drum out of gear and a heavy-lift treble reduction drum into gear. The heavy-lift drum is capable of hoisting a load of 25 tons on a nine-part fall at a speed of 9 feet per minute. The motors furnishing power to the winches are all of 25 horsepower. The winches are of rugged construction and did not exceed the motor rating on any of the performances cited above.

Similar type winches are used with the cargo arm cranes at Nos. 3 & 4 blind hatches. The cargo winches were designed and built by the builder of the vessels. Recognition has been given to the possibility of the ships entering ports where one man is permited to operate two winches, and the controls for each pair of winches are placed in such a position that they can be worked by one operator located immediately fore or aft of the centerline of the various overall hatches. The controls have been located so that the operators have a full view of the holds at all times.

Cargo Cranes For Blind Hatches

The use of cargo cranes in way of Nos. 3 & 4 blind hatches exemplify the efficiency of cargo handling management and the application of scientific principles to loading and discharging.

In the loading of coffee, coconuts, and other bagged cargo, the bags are placed on belt conveyors and carried into the ship through the sideport hatches Nos. 3 & 4 to the blind hatches located on the main 'tween decks. Chutes are placed from the main 'tween decks to the lower 'tween decks and from there to the holds. One chute is placed fore and aft, while the one below it is placed adjacent and aft and fore. The bags come off the conveyor and shoot down the first slide. At the bottom of the first chute two men pick up the bags and slide them down the adjacent chute into the holds where the gang stows the bags.

Operating on No. 4 blind hatch, two such chutes may be placed and thus both the port and starboard No. 4 holds can be worked at the same time. This is an impressive application of the gravity principle of materials handling. Access is had to the Nos. 3 & 4 'tween decks and holds both through the overall and the blind hatches. This means that the cargo can be stowed from both ends by two gangs, thus speeding up the process of loading.

In discharging from the holds and lower 'tween decks sling loads of freight, in the main bagged cargo, are made up in the holds in way of the Nos. 3 & 4 blind hatches. A line is lowered from the cargo arm crane in the main 'tween decks to the hold and the draft made fast. The sling-load is then hoisted to the main 'tween decks. When the draft has cleared the hatchway the crane arm swings around on a semi-circular monorail, which allows the arm to be swung either to port or to starboard. The bags are landed on the deck, picked up by the longshoremen and placed on electrical belt conveyors, on which they are moved out to the deck of the pier. It is also possible to discharge from holds Nos. 3 & 4 by way of the overall hatches, giving two points of exit for the cargo.

But one crane is needed at No. 3 blind hatch because both the No. 3 lower 'tween deck and hold compartments consist of one large space extending the full width of the ship. At No. 4 blind hatch, however, two cranes are necessary because the shaft tunnel divides the No. 4 cargo hold into two sections, port and starboard.

The modern cargo handling features of the new Colombian ships and the manner in which they are used bear testimony to the efficiency of the Colombian Line organization.

Passenger Business Up

As an indication of greatly improved passenger business, the following is quoted from a statement recently made by Mr. Baird, passenger traffic manager, Canadian Pacific Steamship lines:

"The most significant feature of this winter's cruise business is that this year, six weeks in advance of the departure of the EMPRESS OF BRITAIN on her world cruise, every suite has been reserved, and we have 25 per cent more bookings now than we have had at the same time last year.

"During the past few years while there has been a fair percentage of demands for expensive accommodations, travel bargains have been mostly sought. A significant feature of this early booking activity which also indicates returning economic confidence is that steamship companies all report their advance bookings in the higher brackets, with cheaper accommodations still available. This is a direct reversal of last year's situation, when at this time practically all the lower priced rooms had been taken. The costly accommodations are outselling the cheaper, which seems to fix the economic improvement idea even more firmly."

Draftsmen Wanted

Open competitive examinations have been announced by the United States civil service commission for positions in ship work, as chief engineering draftsman; principal engineering draftsman; senior engineering draftsman; and engineering draftsman.

Applications for these positions must be on file with the United States civil service commission, Washington, not later than Jan. 14, 1935. The entrance salaries range from $2600 for principal engineering draftsman to $1800 a year for engineering draftsman, subject to certain deductions.

Full information may be obtained from the secretary of the United States civil service board of examiners at the post office and custom house in cities having a post office of the first or second class, or from the United States civil service commission, Washington.

Purse Seiner

(*Continued from Page* 27)

er carrier by 15 tons, while weighing 15 tons less than AMERICAN EAGLE. In wood construction it is necessary to carry the break farther aft to allow headroom for the engine. In steel the engine is set lower and the forecastle length allows for quarters. This sets the house down more than two feet so that the pilot house can be placed on top of the main deckhouse, giving the operator greater comfort and an enlarged view.

As against sleeping accommodations for 10 men in the wood craft, the steel vessel has room for 20, as follows: Eight berths in the forecastle, four in engine room, which is free of tanks, two in the stateroom in lower deckhouse and four bunks in quarters behind the pilot house. This increase in quarters is a material advantage as it permits operators to carry employes to and from the fishing grounds.

Welded Construction Better

On the wood seiner an exhaust smoke stack is installed. On the C. S. F. the steel mast is used for this purpose. Twenty-inch ventilators lead into the engine room keeping it clean and fresh. One man control is provided both inside and outside the pilot house.

Experience indicates that riveting is impracticable for fishing vessels. The reason is that the meshes of the net catch on the projecting plate edges not only damaging the gear but endangering the haul. The electric welded hull gives a smooth surface so that nets can be handled under the keel and on all sides without being torn or cut.

The illustrations show the additional deck space aft on the steel seiner, due to the saving of space forward and in engine room. This is a big advantage in operating. The steel vessel can carry 100 more barrels of herring in the hold and three or four times as much fuel. In both types the pilot houses are about the same height. It is claimed that the steel craft handles easier in sea drifts. On the average there is a gain of 20 per cent power efficiency for the steel vessel not only because of the greater weight, but also because of the additional wetted surface and consequently increased frictional resistance of the wood hull.

It has long been a popular idea that wood hulls were superior in Alaskan waters where hidden reefs, some uncharted, are an everpresent danger. The theory is that wood vessels can withstand heavy damage and still remain afloat, whereas one puncture might sink a steel craft. This has been anticipated in the design of the C. S. F. which has 14 water tight compartments and is of heavy construction. The builder believes she will stand more severe service than wood.

Steel for Other Types

Other steel designs, adapted for the requirements of other branches of the fishing industry, are being developed. Among these is a combined troller and halibut fisher. This type requires cooled space. Tentative plans provide for insulation and lining built into the fish hold. It is designed to be built in removable sections with cork packed between cedar veneer, so that it would not interfere with hull repairs. Plans are also being developed for a special steel hull for the halibut fleet, which would provide more space and greater speed. The power units now in these wood vessels could easily be installed in the proposed steel hulls.

The General Engineering and Dry Dock Co., Oakland, Calif., has received contract for repair to the nited States engineers' sea-going hopper dredge SAN PABLO, on which bids were open Dec. 11, at a cost of $37,667.40 and a time of 24 days. This was the lowest of three bids, both in cost and in time.

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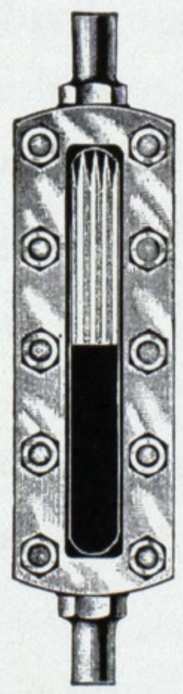

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Machinery for Cutters

(*Continued from Page* 17)

The turbine drive is of the single wheel, impulse, re-entry type with the rotor keyed to the upper end of the pinion. Steam leakage from the turbine cylinder along the shaft is prevented by a carbon gland. The pinion shaft is carried in two babbitted journal bearings.

Speed of the unit is regulated by an oil operated double seated poppet valve, which in turn, is controlled by the governor. The governor for these units consists of a small centrifugal oil impeller machined in the lower extension of the pinion shaft.

The air ejectors are of the two stage condensing type, using condensate as a cooling medium. Two complete ejector elements are mounted on a common inter and after condenser, thus providing one complete spare unit to take care of excessive air leakage.

Each stage contains only one large steam nozzle, which reduces the possibilities for clogging to a minimum.

Condensate Pump, Auxiliary

Two motor driven, vertical, centrifugal condensate pumps are supplied, each one being of sufficient capacity to take care of the maximum amount of condensate. Each pump will handle 21,000 pounds per hour against a total head of 60 feet. A three horsepower motor serves each pump.

This condenser is of the same general type of design as the main condenser. It has a tube surface of 200 square feet. The tubes are ⅝ inch outside diameter and are secured as in the main condenser.

A six-inch diameter propeller type circulating pump is mounted in the lower part of the inlet water box. It is driven by a vertical motor mounted on top of the water box. A rubber bearing is used at the pump end of the shaft and a gland having soft packing prevents water leakage at the upper end. The designed capacity is 800 gallons per minute against a total head of 15 feet. The motor has a capacity of 5 horsepower.

A two stage condensing type air ejector serves this condenser. It is also mounted on the condenser shell.

One horizontal, motor driven, centrifugal pump removes the condensate from the condenser. It has a capacity of 4000 pounds per hour against 60 feet total head.

As a considerable number of the auxiliary units are electrically driven, the generating apparatus is of larger capacity than usual for a vessel of this type. Two 35 kilowatt, direct current generator sets driven by geared turbines are furnished.

The turbine is of the single wheel, impulse re-entry type. The steam enters the turbine through a strainer, quick closing throttle valve controlled by an automatic stop governor, and a governor valve controlled by the direct acting fly-ball governor. A hand controlled nozzle valve is incorporated in the design to permit efficient operation both when operating condensing and non-condensing. The turbine is designed to operate on 250 pounds gage, 27½ inches vacuum and also with atmospheric exhaust.

Power is transmitted through a single reduction, helical gear of the fixed bearing type. The gear wheel is secured to the generator shaft extension by means of a taper fit and is held in place by a securely locked nut. The generator is of the open type with a canopy cover. It is compound wound with commutating poles, self excited and natural ventilated, and is designed for 120 volts and 40 degrees Centigrade rise for continuous operation.

After the pumps had been tested independently, the first complete propelling unit with its condenser and auxiliary apparatus was erected in the shops and an extensive series of runs were made at different speeds and powers, ahead and astern. During these runs a complete number of economy runs were also made. The guaranteed steam consumption rates were easily met and improved upon.

The Battle Cruiser

(*Continued from Page* 26)

cruiser characteristics which we have enumerated can be obtained only on a displacement several thousand tons greater than that of contemporary battleships. Inasmuch as the displacement of the latter has been limited by treaty of 35,000 standard tons, the building of a battle cruiser to meet fully our specifications is not possible at present. The nearest approach would call for compromises resulting perhaps in reduced gun power and lower speed.

In case the powers, upon the termination of present armament treaties, agree to some further limitation on the size of battleships, it will be possible to provide for the construction of efficient battle cruisers by setting a somewhat higher limit on their displacement. For example, if it be decided to limit battleships to 25,000 tons in displacement and to guns of 12-inch caliber, the size of battle cruisers might well be set at 28,000 tons. On the other hand, if the powers decide to retain the present limit of 35,000 tons for battleships, they might well consider a limit of 38,500 tons for battle cruisers.

At present the British navy has three battle cruisers and five fast battleships in a total of 15 capital ships, while a third of the battle fleet of Japan is of the battle cruiser type. The United States and Italy are without battle cruisers, and France has one in course of construction.

Some may object to the construction of battle cruisers on the grounds that the present 10,000-ton cruisers with their high speed and with their 8-inch guns can perform all essential cruiser duties. If our study has shown anything, it has proven that such is far from the truth. The high speed of the treaty cruisers might enable them to escape destruction in case of contact with enemy battle cruisers, but such escape would be by no means a forgone conclusion. A single hit from one of the guns of the latter ships might easily destroy a 10,000-ton cruiser or cause such a loss in speed that she would meet the fate of BLUCHER at Dogger bank. It is hardly probable that the speed of the current treaty cruisers would enable them to retire from the presence of enemy battle cruisers without very serious injuries. Light cruisers cannot engage, without very great risk, in many independent missions or in reconnaissance in force at great distances from their bases unless they are supported by powerful and fast ships, that is, by battle cruisers.

The Treaty Cruiser

Moreover, the battle cruisers' duties in fleet actions, as demonstrated at Jutland, are quite beyond the capabilities of treaty cruisers. Such ships might carry out satisfactorily some of the preliminary scouting work provided there were no enemy battle cruisers present. Once contact between the battle fleets had been established, however, the treaty cruisers would present tempting and vulnerable targets (Arbuthnot's squadron at Jutland) for enemy capital ships and destroyers, and would have little to contribute in offensive power.

The imminence of the termination of current armament treaties makes the present an appropriate time to study the merits and shortcomings of all types of warships. If past experience be a reliable guide, we may expect future naval wars to develop many situations where ships of great offensive and defensive power and with high speed will be in urgent demand. These characteristics are peculiar to but one type of ship, the battle cruiser. Large navies of the near future will be at a disadvantage without vessels of this type.

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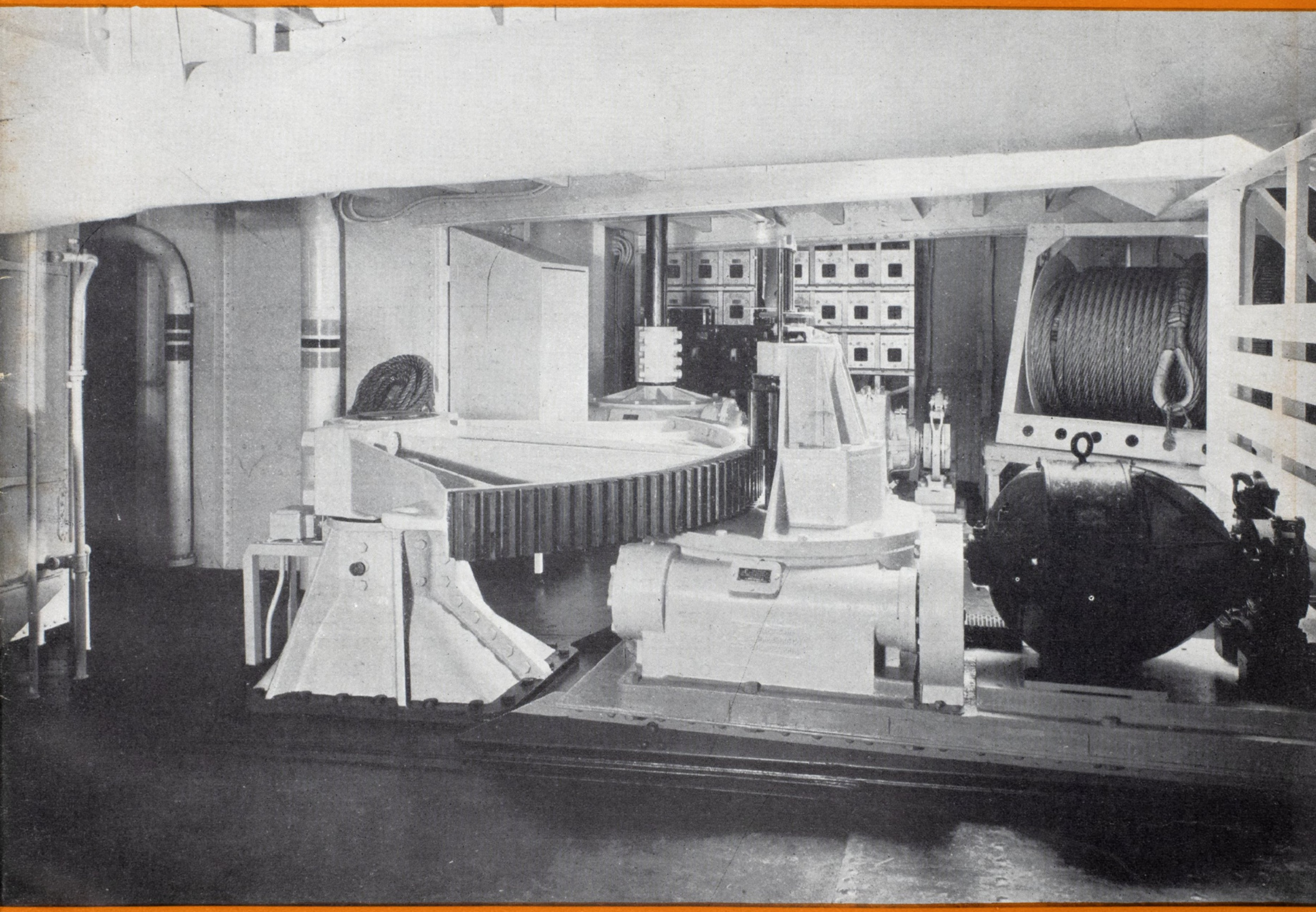
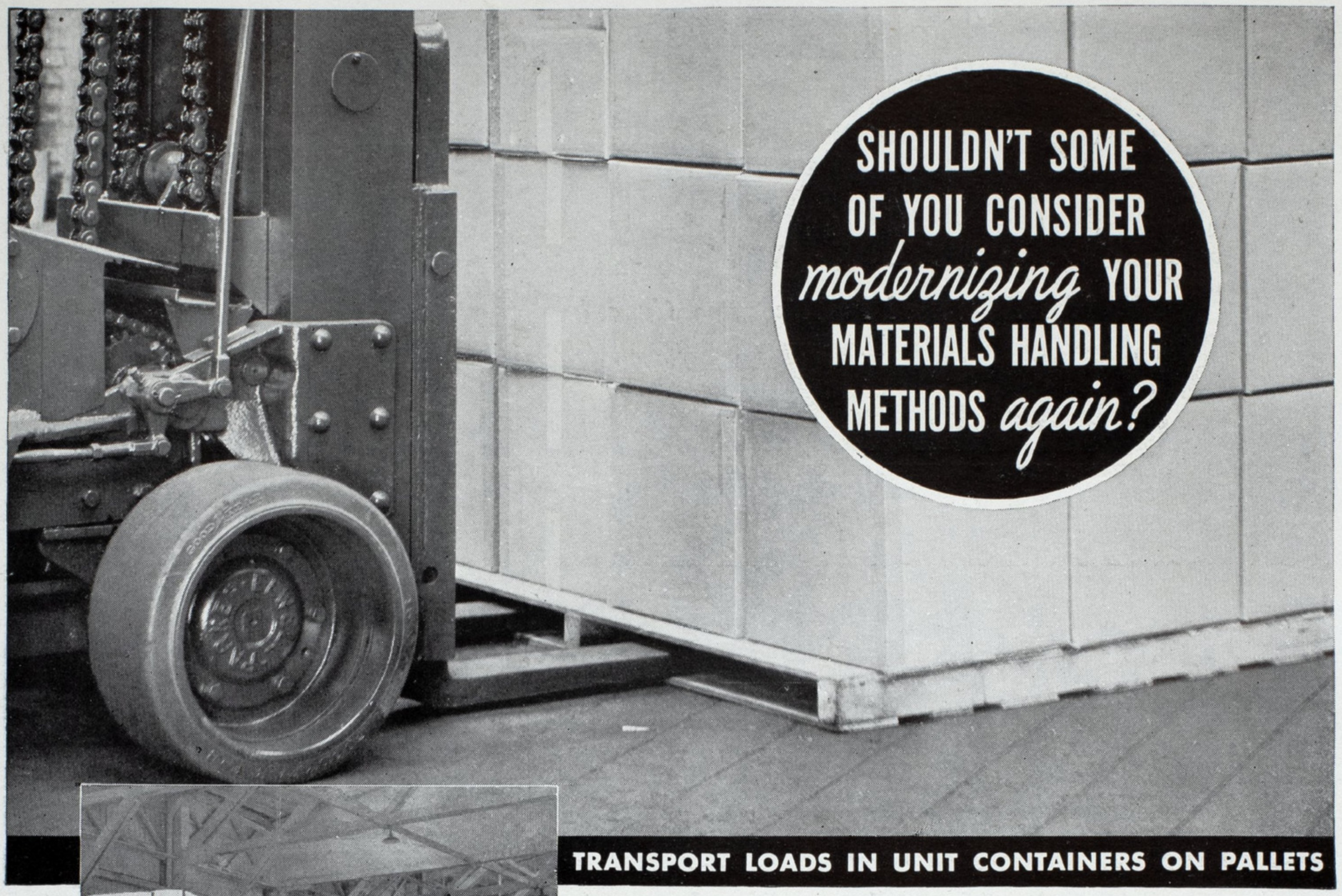


Auxiliary Steering Gear—S. S. Manhattan

January, 1935



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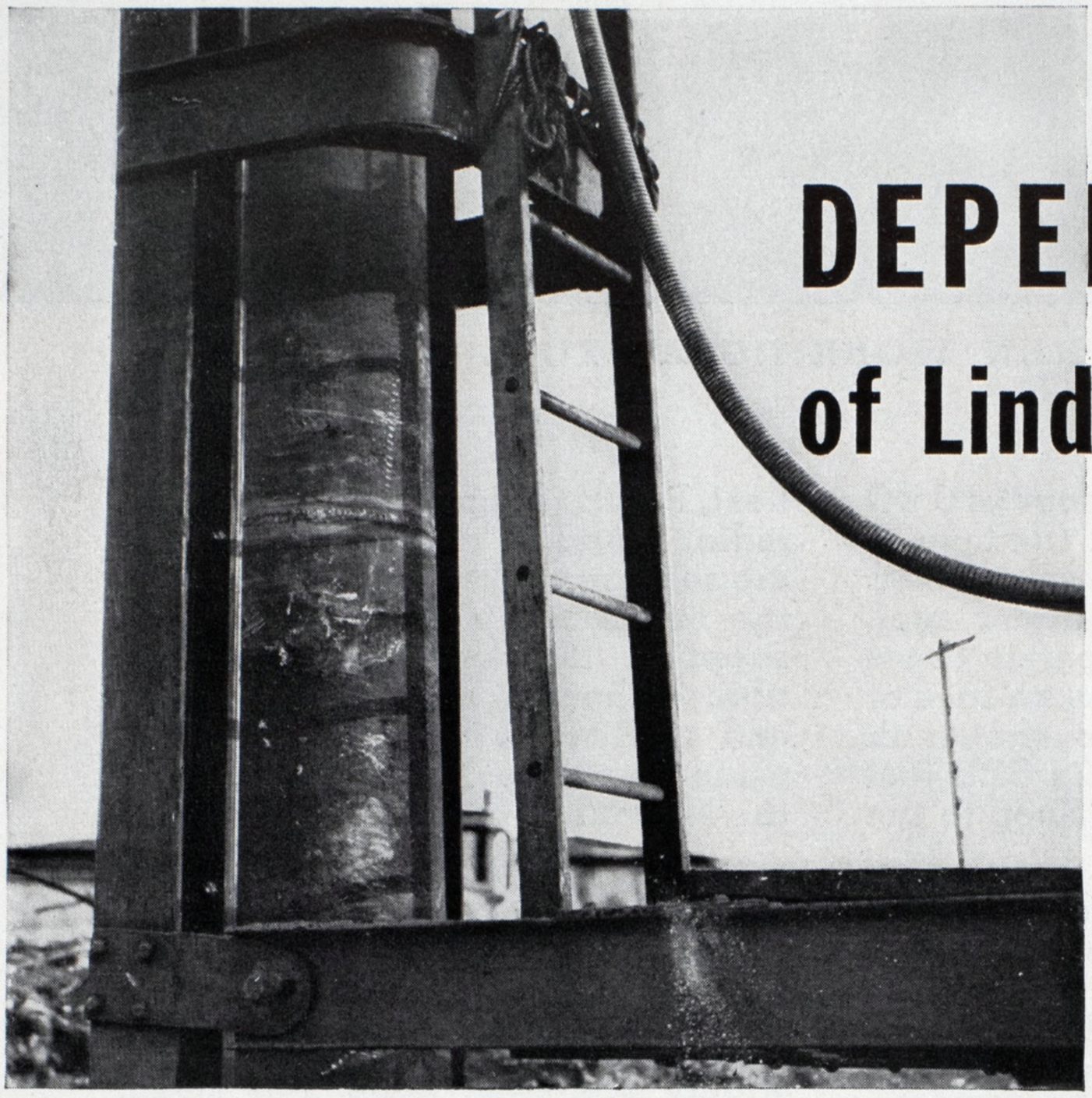

● GOING DOWN—Lindewelded sections of 16-in. steel pipe piling surely reach bed rock without danger of crushing from 4-ton blows of steam hammer.

IN the construction of a modern steel and concrete building on soft ground, plans called for 250 steel pipe piles, concrete filled, in groups ranging in depth from 25 to 60 feet. Altogether, 13000 feet of 16-in. pipe were necessary. These piles were required to withstand the sudden stresses from 4-ton blows of a steam hammer. The pipe dealer called on Linde Process Service for assistance in jointing short lengths of pipe for this purpose.

The pipe had to be strongly joined to permit driving without any chance of crushing, bending or warping. A Linde Service Operator demonstrated the Lindeweld method of making the pipe jointless. Results convinced the pipe dealer and the pile driving contractor—and the pipe was oxy-acetylene welded.

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THE NYS "YARD" covers 190 acres of ground, with a frontage of 4270 feet on the Delaware River. There are 56½ acres under roof, including the area of separate floors under the same roof. As an idea of the size of the structures, shown on the Air-View, Way "O" is 826 feet long from the Machine Shop to the end of the roof.

Almost all types of Merchant and Naval ships have been designed and produced by NYS; from harbor tugs and ferry boats to battle ships, and such palatial liners as the "WASHINGTON" and "MANHATTAN." Fast cruisers and destroyers have established high standards of speed, fuel efficiency and reliability, propelled by NYS-built turbines.

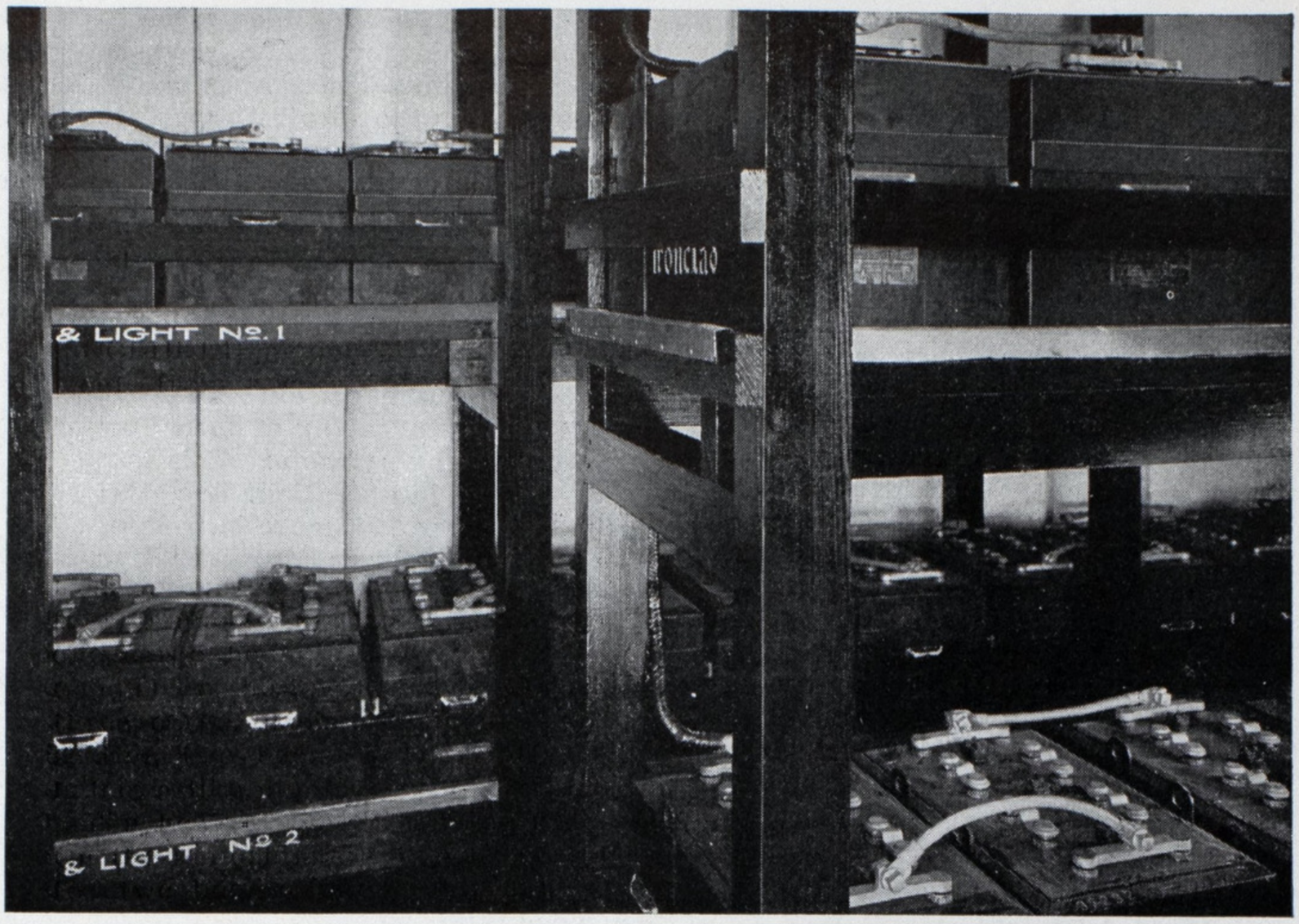
A ship at sea is a floating city. All the utilities necessary—power, heat, lights, refrigeration, telephone, radio, laundry, commissary, etc.,—are self-served, out in the middle of the ocean, away from any base of supplies. A Naval vessel, in addition, embodies all the equipment and appliances that progress has made available for the defense of the Nation.

Hence, a wide variety of crafts is required in shipbuilding, involving the employment of all the manufacturing arts in the yard, drawing room and office, and in the plants of widely scattered, large and small, associated manufacturers.

NYS "YARD" was one of the very first built solely for the design and production of metal ships, without any adaptation from facilities for building wooden vessels.

NEW YORK SHIPBUILDING CORPORATION

Camden, New Jersey, U. S. A.



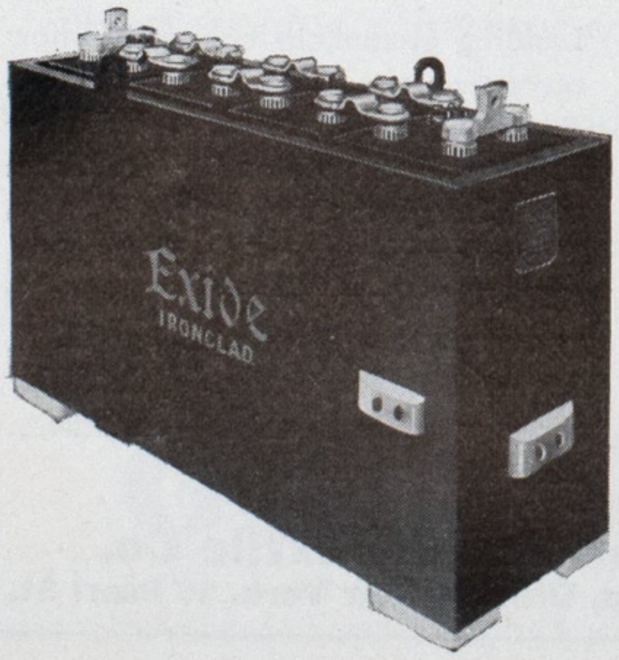
You can effect a DOUBLE SAVING WITH EXIDE

With their characteristically long life, their proved dependability and maintenance economy, Exide-Ironclad Marine Batteries give service at consistently low cost. These Exide-Ironclad advantages are now more outstanding than ever, due to the use of the new Exide Mipor Separators—the permanent storage battery plate insulator.

Exide Mipor is immune to battery heat, a feature of special value under marine conditions, in which extremes of temperature are often encountered.

The Exide Marine Floating Battery System makes possible a further saving. Extremely simple in principle and operation, this system automatically keeps the battery charged, relieves generators of peak loads, and permits the use of smaller generating units. Should generators fail for any reason, the battery instantly assumes the entire electrical auxiliary load, without the use of switches or relays. Write for booklet, "Exides for Commercial Vessels."

EXIDES FOR DIESEL STARTING—Specially constructed Exide Batteries of three different types have been developed for Diesel starting. Packing maximum power into minimum weight and space, these special Exides meet the low temperature starting requirements of all high-speed Diesels.



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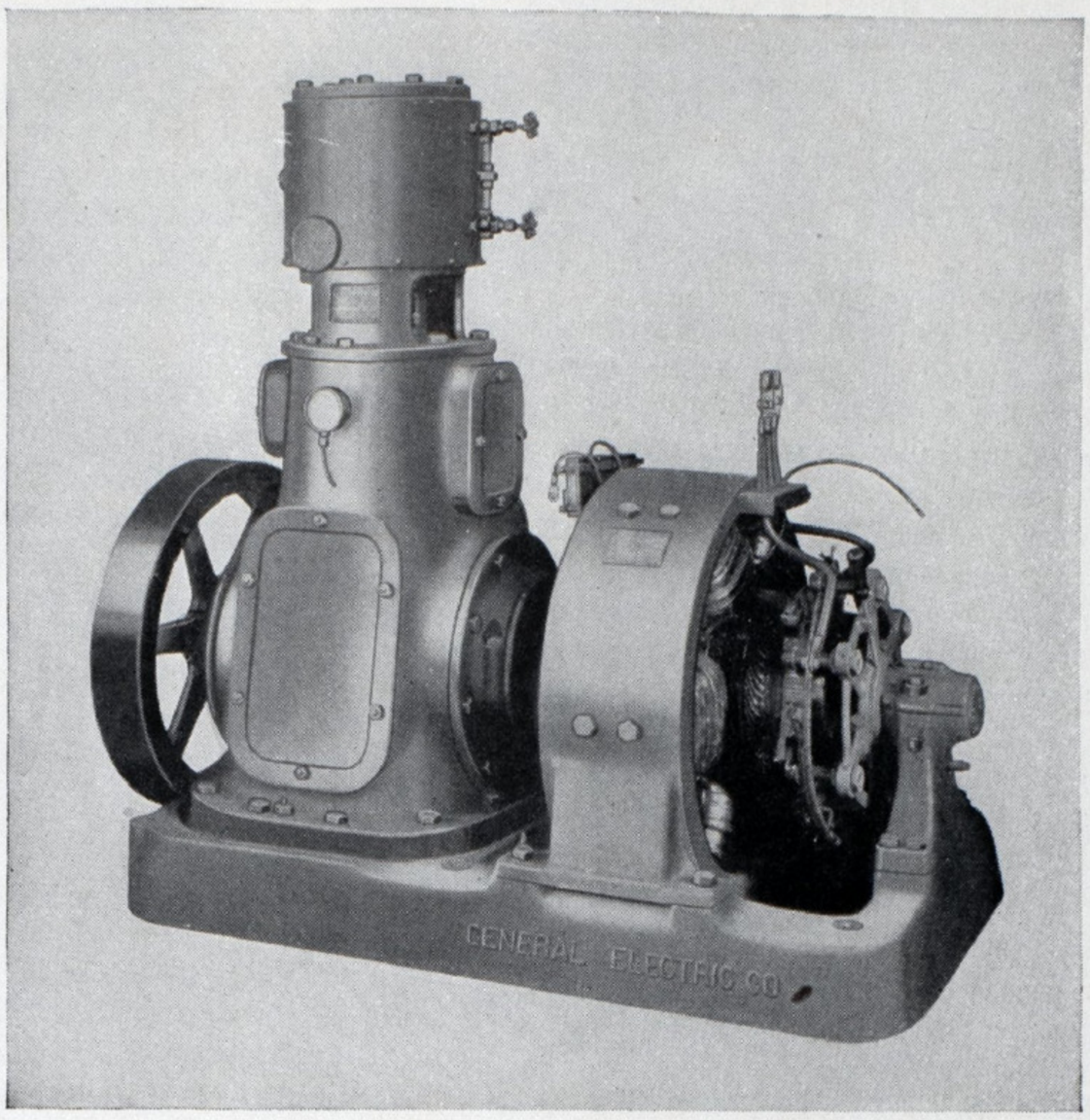

This Trim Generating Set will meet many of your needs

If you require small blocks of power—for lighting, for auxiliaries, for radio — this G-E marine set will supply them reliably and efficiently.

It consists of a highly efficient steam engine, which takes steam at any standard pressure and temperature and drives a G-E generator that delivers direct-current power at 110 to 125 volts.

The ratings are from 5 to 60 kw.—for either two-wire or three-wire service. Sizes up to 30 kw. are carried in stock and can be shipped promptly.

Check the features of this unit and see if they meet your ideas of what a marine steam-engine generator set should have.

For complete information about these sets, or about any electric equipment, address the nearest G-E office, or General Electric, Schenectady, New York.

FEATURES

Forced-oil Lubrication

The main bearings, crank pin, wrist pin, governor bearing, eccentric, and guides on the engine are lubricated by oil under pressure. After passing through the bearings, the oil returns to the reservoir to be used again. This feature gives quiet operation, minimizes attention, lessens wear, and reduces the quantity of oil required.

Raised Cylinder Improves Lubrication

The piston rod passes through a stuffing box in the top of the enclosing column. The cylinder is raised high enough so that no part of the piston rod entering the column stuffing box also enters the cylinder stuffing box. This prevents oil from creeping along the rod to the steam spaces, and keeps condensate from getting into the column and emulsifying the oil.

Governor Is Totally Enclosed

The automatic governor, on 30-kw. and smaller sets, is totally enclosed by the column. The valve eccentric is in direct alignment with the piston valve, and a simple, direct valve motion is used without any offsets or rocker-arm intermediary.

Highest Possible Efficiency

Short, direct passages between the cylinder and the valve-chamber ports, accurate fitting of all valves, crosshead guides, and bearings — these are some features of this engine which make for the highest possible efficiency.

Generator

The generator, of rolled-steel frame construction, represents the latest development and the most advanced design yet offered in this class of apparatus.

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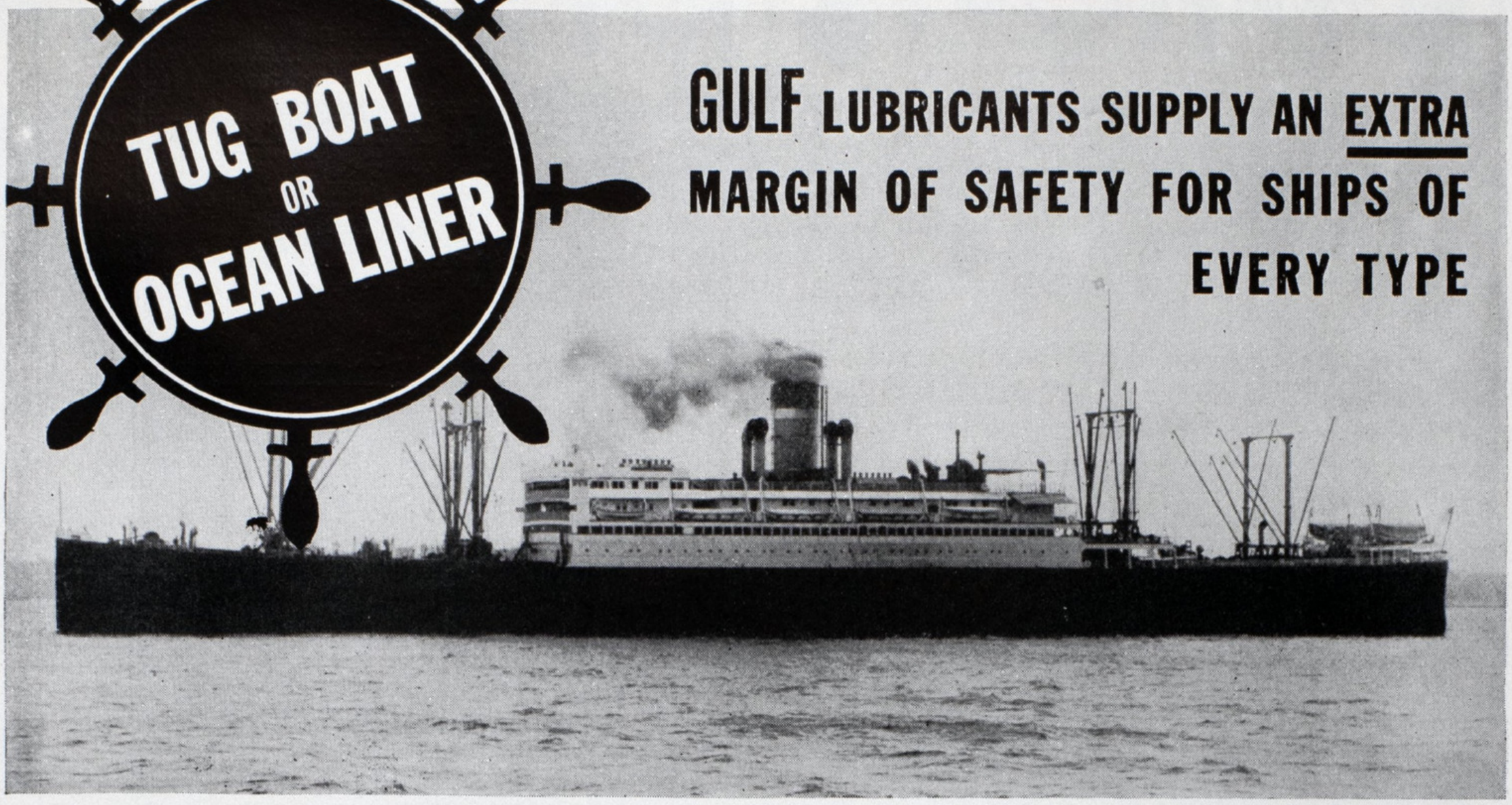
GULF LUBRICANTS SUPPLY AN EXTRA MARGIN OF SAFETY FOR SHIPS OF EVERY TYPE



S. S. Southern Cross—one of the great Munson liners which runs between New York and Buenos Aires, a distance of more than 6800 miles—which is more than twice the distance from New York to Liverpool. Gulf lubricants protect her power plant from excessive friction, wear and repairs under the extremes of temperature encountered on the 18 day trip each way.

FOR SHIPS of every size and type—from ocean going liners to harbor tug boats—Gulf supplies a *complete* line of *quality* lubricants.

Ships need that extra margin of safety supplied by lubricants that have been refined by the most modern methods. The famous ALCHLOR process, used in the refining of Gulf's highest quality lubricants, is the most thorough and effective method of removing impurities and unsaturated hydro-carbons from oil. This permits Gulf to offer marine operators lubricants of unparalleled quality.

Not only does this superior quality insure an extra margin of safety for propelling units, but it means a *definite reduction in wear and repair expenses.*

Consult freely with a Gulf engineer regarding your operating problems. He is a thoroughly trained marine engineer and can help you improve the lubrication and operation of the equipment on your ship.

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PITTSBURGH, PA.

In spite of wind and tide, tug boats must perform with perfect timing and efficiency. Gulf supplies just the right type of lubricants to keep tug boat engines operating economically and without mechanical difficulties.

GULF QUALITY MARINE LUBRICANTS AND ENGINEERING SERVICE ARE AVAILABLE IN LEADING PORTS ON THE ATLANTIC SEABOARD, GULF OF MEXICO AND THE GREAT LAKES

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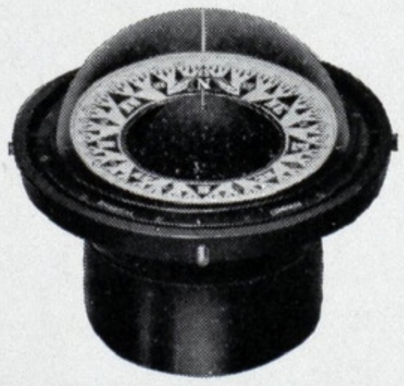

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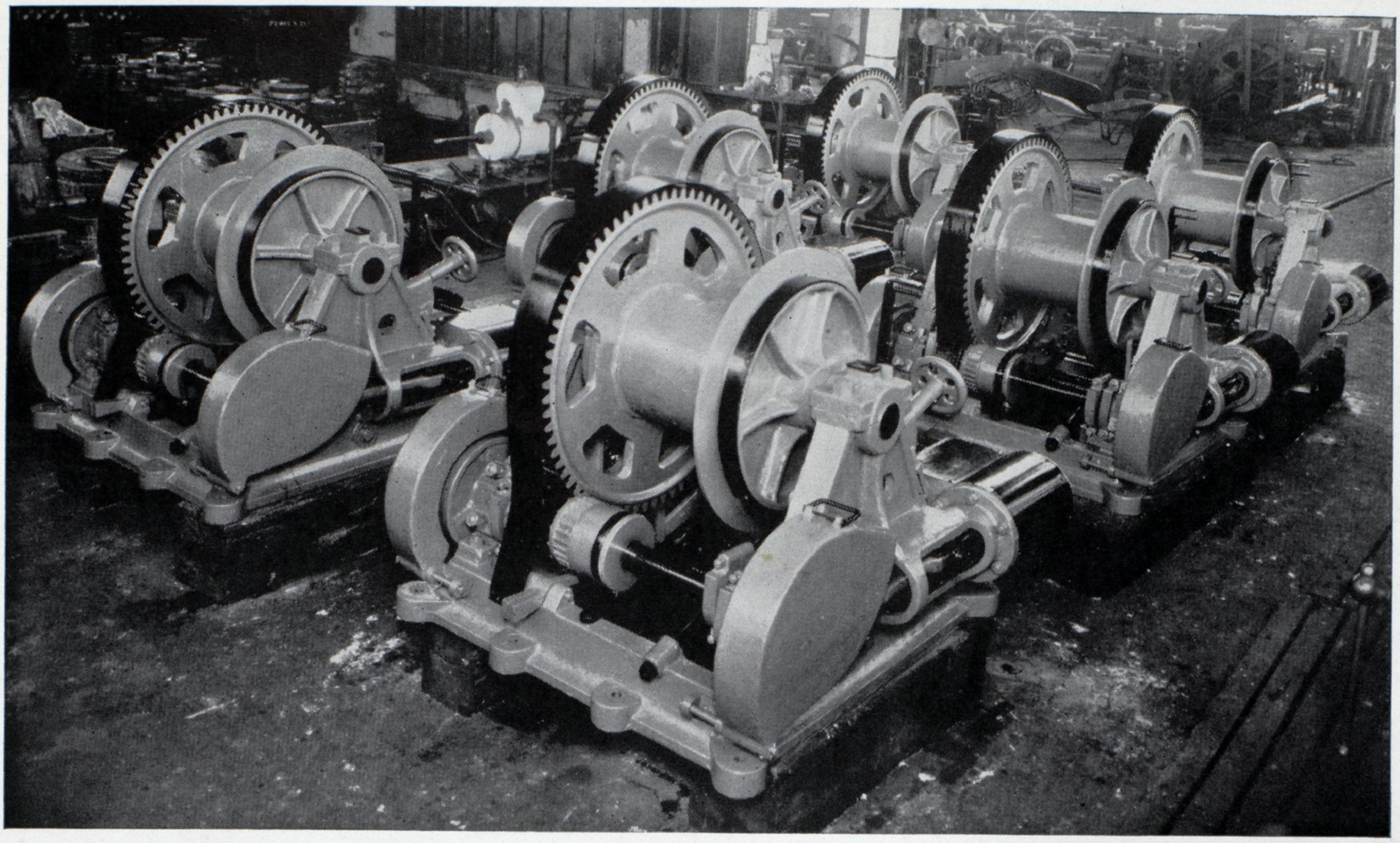

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They have plenty of power to handle any ship—and the 16-inch drum of the most popular size engine will accommodate 600 feet of 1¼-inch wire cable.

They are made of unusually high grade, high tensile strength iron.

They have *cut gears*—and for the fifteen years we have been cutting them, so far as we know, there has never been a broken tooth.

They have link reversing gears . . . the kind of reverse most engineers prefer, because the valves in this type have a comfortable lap which prevents steam leakage.

They have friction brakes . . . applied by a wheel and screw arrangement.

The cylinders are magnesia packed . . . which cuts down heat losses.

All moving parts are adjustable to take up wear.

These engines will fit any ship and they have an exceedingly sturdy mounting. The mooring cable will break before they are pulled off.

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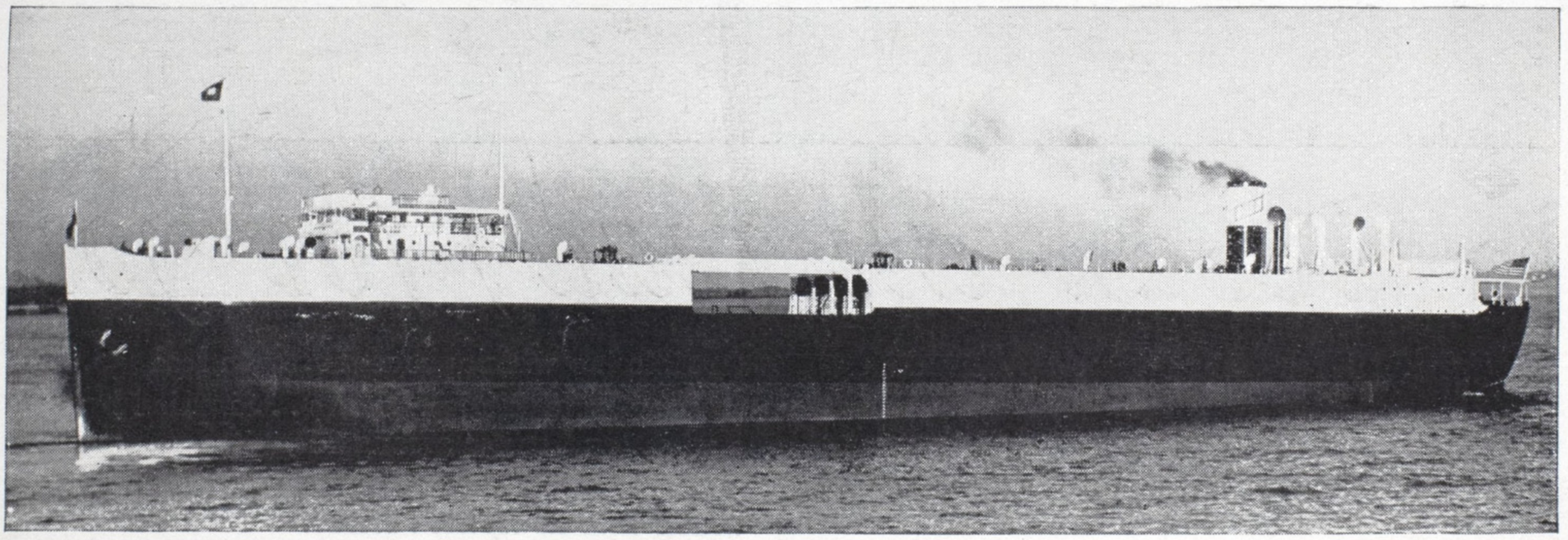

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